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COVER STORY/FEATURES



The Enhanced AT: A Personal Vision120 Michael Finefrock with Dick Aarons and Brian C. Hale/Once IBM's heralded AT was out of the box and in the office, users discovered that it wasn't everything they expected. Fortunately, third-party manufacturers have filled in the gaps by developing add-on and add-in products to power up IBM's new micro. Here is one user's version of the ultimate AT.

THE PRICE WATERHOUSE REPORT Nonprofit Accounting with PC-FUND ...

G. William Dauphinais, Michael A. Yesko, and Christopher W. Buttine/Most of the accounting software on the market today is targeted at companies that want to build the bottom line. AFI's PC-FUND is designed to deal specifically with the specialized accounting problems faced by nonprofit organizations.

PERSPECTIVE

Business Accounting Software Comes of Age? 146 G. William Dauphinais and Michael A. Yesko/To mark the first anniversary of PC Magazine's Price Waterhouse Report, the authors look at past trends in the accounting software market and venture a few educated guesses about where it might be beaded.

SOFTWARE

Word Takes Another Forward Stride ...

Diane Burns and S. Venit/Word, the avant-garde word processor from Microsoft, has undergone an important facelift. Version 2.0 retains all the advanced features of the original package and corrects some of its flaws. It also continues a Microsoft tradition by adding support for newly affordable advanced technologies like laser printing.

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USER TO USER233 Paul Somerson/Tips and short programs.

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Anthony Barcellos/The Math Utilities fill a gap in the software market: high-quality scientific graphics.



EDUCATION Confessions of a PTA Fund-Raiser 249 Robin Raskin/A parent

and PC owner gives advice on how to use your PC to raise money at grammar school fund-raising



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Mainframe Financial Modeling Comes to the

Ken Edwards/Execucom's IFPS/Personal is a microcomputer adaptation of the popular mainframe software package that picks up where your spreadsheet leaves off.

Sidekick Puts Windows on WordStar's World 188 Stephen Manes/Do you stand by WordStar despite its lack of certain advanced features? Sidekick adds jazz to cure the WordStar blues, Windows and sophisticated subdirectory access can be yours by combining these two software standbys.

COMMUNICATIONS

Long-Distance Computing at Full Power ... Frank J. Derfler, Jr./Ever wish you could access the PC in your office from the comfort of your home? With this clever combination of hardware and software, you can boot up your PC from afar with a portable micro or terminal and a modem.

HARDWARE

megabytes of high-speed disk access to professional PC and network users. But its power and versatility may make it too complicated for the microcomputer novice.

BOOK EXCERPT

and XT lists BASIC and Pascal programs for business applications. Reprinted here is a chapter describing APPRAISL, a job-performance rating program.

Preserving the Past on Disk..... Brad Lemley/A system being developed by the Smithsonian Air and Space Museum promises to digitally store and index







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What's Inside

Hanging around the PC office coffee machine (and not the water cooler) can be a great way to hear the latest gossip about various writers and get hot tips on the contents of the next issue.

s in most offices today, the social life of the employees of PC Magazine centers around the coffee machine. (Popular mythology has it that office life centers around the water cooler but such a notion does not take into account the prevalence of caffeine addiction among office workers.) Since the coffee machine is on the refrigerator. which is under the bulletin board, which is next to the mail shelves, and since cookies, pastries, and other refreshments are regularly available, people hang out there almost continuously. In fact, the voracious appetites of the editorial staff have become somewhat legendary-an art department staffer was heard once referring to us politely as "that bunch of piranhas."

By a quirk of fate, the office of the person who could benefit most from listening to the gossip that swirls around the coffee machine (that is, the person who writes this column) is conveniently located right opposite this crucial spot. The person in question was within earshot when the following conversation took place.

Hot Tips

Associate editor Lisa Kleinman: "I was talking to Mike Finefrock today. I've never seen him so happy. What's he working on?"

Associate editor Jennifer de Jong: "Well, I've just assigned him the cover story on enhancing the AT." Kleinman: "So?"

de Jong: "It means that Finefrock gets to stuff every peripheral available for the



AT into his machine. With the help of Dick Aarons and Brian C. Hale, he'll be inspecting graphics and multifunction boards, data storage, floppy drives and backup, utilities software, communications packages, and who knows what else. The man's in bearen."

Assistant editor Cheryl Goldberg, who had come to freshen her coffee cup, asked, "Is Jared Taylor also working on that? He seemed especially cheerful yes-

De Iong shook her head. "No, but he's got his own project in the issue: the Spreadsheet Clinic. It seems that the Clinic was so popular with our readers that we're bringing it back as a permanent part of the editorial well." She sipped, then continued, "We've also been working on the professional columns, and this issue's set includes pieces

by Anthony Barcellos on using math utilities to build up graphics, N.B. Forrest on business forecasting, Dr. Bernard Friedman on using a PC for continuing medical education, and Robin Raskin on fundraising."

PC News News

Assistant editor James Langdell, who had brought along an herbal teshag (he's from California and doesn't know better), grinned and said loudly, "I noticed that the person who writes What's Inside din't mention that PC News has been to-tally redesigned. It now not only includes up-to-date hard news, but also the latest in microcomputer gossip, interviews with top members of the industry, and other provocative pieces from the perspicacious pundits as P.C."

"I heard everything!" a voice answered from the opposite office. "Just for that, I'm going to write my next column about the coffee machine!"

Other Popular Places Another popular place in the PC edito-

rial offices is the Toy Shop, where new hardware and software products can be found. However, in recent weeks the room has been more populated than ever, owing to the appearance of the PC Magazine Interactive Reader Service [(212) 696-03601].

PC's editors had been thinking about establishing an on-line bulletin board for a couple of years. However, the final impetus came when we ran a couple of very long programming columns with a lot of intricate numbers. These numbers can cause some enterprising readers to become very confused; as soon as the magazine hit the stands, the phones began ringing off the hook and the staff began bouncing off the wall. Editor Bill

Machrone brought together the technical staff and said, "Wouldn't it be better for everybody if we had these programming columns on an electronic bulletin board where everybody can get them accurately and where any bugs can be fixed overnight?"

On-Line Gossip

Serendipitously, technical editor Craig Stark happened to meet Tom Mack of the Capital PC Users Group in D.C. Mack had recently concluded an agreement to supply bulletin board softwere for the whole public education system of West Virginia. After listening to Stark's story, he sent PC a copy of RBBS-PC, which was introduced last year and has become a kind of bulletin board standard. Stark and company modified the software slightly and, in early March, introduced it to PC's readers.

Since then, the electronic bulletin board has been extraordinarily popular. This popularity has done a great deal for Stark's spirits-when the first lood of printouts containing approving comments was dumped on his desk, even the smoke from his ever-present pipe seemed to radiate cheer.

Cranky Messages

Unfortunately, this popularity has also led to a certain frustration emong PC staff members. Since ell the reelly good programs published in PC end up online it stands to reason that PC's staff would also want to take advantage of the service. However, the telephone connection is almost constantly busy, at least during working hours, and so often it is several days before even one editor can make the connection. (Incidentally, PC is in the process of expanding the board to handle multiple users, a development that will ease the problem considerably.) And since Stark likes to check up on the progress of his project, there is a good chance that, in the middle of a download, an editor will be faced with a sudden

sysop (systems operator) message: "WHY ARE YOU TYING UP THE BULLETIN BOARD?

Such a message is very traumatic for any self-respecting employee. It can drive one to desperate measures, such as joining the group near the coffee machine and encouraging everyone to put cranky messages on the bulletin board. . . .





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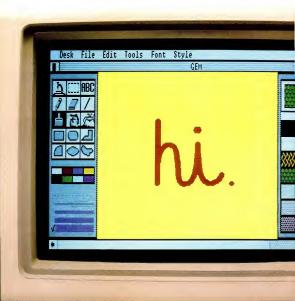
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And voilà, your IBM PC, PC/XT, AT or compatible will become something it's never been before.

Easy to use.

Now instead of getting lost in PC DOS, you can actually use your PC to get something done. (An astonishing idea, if ever there was one.)

Just slip a GEM diskette into your disk drive. And the rigmarole of PC DOS is replaced by a way of working that's easy, effortless and altogether personable.

You see, GEM lets you work with a simple descriptive header menu, icons, drop-down menus, windows and a pointer.

Which means you can now use your computer to write, figure, draw and even think the way you used to. Before less-than-friendly computers made you change your way of thinking.

In other words, your tool for modern times has finally become a tool for

modern times.



To see how easy it is to use GEM, take this simple screen test.



OK. Take a close look at these two screens.

One is an IBM PC with PC DOS. The other is an IBM PC with GEM.

You get to figure out which is which.

The PC DOS screen is the one that seems to be designed for an engineer. Or someone with a photographic memory.

It requires you to type and memorize nonsensical terminology like c>copy\myprog2.com\level 1\myprog2.com. All just to copy a file.

But most people think in ideas. Words. And pictures.

Which brings us to the GEM screen.

It's the one with pictures of the things you use in your office. Like file folders.

Diskettes, And a wastebasket.

Plus words describing the kinds of things you do in your office. Like OPEN FOLDER. SAVE FOLDER. And OUIT.

Copying a file is as easy as pointing with a mouse (or cursor key—if mice make you uneasy) to the file you want to copy. Then you just slide the file across the screen to the diskette you want to put it on.

Well, by now we've probably given it away.

If you guessed that GEM is on the right-hand screen, you're absolutely right. And if you think GEM looks easy to use, you're right again.



Now, given a few pointers, anyone can use an IBM PC.



Have you ever noticed how people in your company get up from their PCs looking rather dazed?

That's called PC DOS anxiety. And it goes away when GEM enters

the picture.

Because with GEM everybody already knows everything they need to know to run a PC.

Like how to point. Click.

Read a menu. Open a file folder.

Or pitch a bad idea in the wastebasket. Who knows, GEM software could

even turn people with deep-rooted PCphobia into absolute PC-enthusiasts.



With GEM software you don't have to switch gears to switch drives. You can just point and click your way from drive to drive. No matter how many drives or diskettes you're using.



GEM file folders hold whatever you put on a diskette. From entire software programs to reports, pictures and presentations.

In fact, GEM file folders can even hold other file folders. And so on.



GEM software even includes "generic" file folders, places to hold random ideas, memos, numbers and the like until you're ready to file them in a GEM folder. Or in the wastehasket.



Part of getting organized is knowing when to let go of outdated files.

GEM can't tell you which files to get rid of. But it can help get rid of them.

And should you toss a file before its time, you even get a chance to change your mind,



If you're clever enough to read these words, you've no doubt figured out what the GEM clock is for. Staying on schedule, for instance. Keeping track of the time it takes to do specific projects. Or getting to your airplane on time.



GEM even includes a calculator, so you can tally up all kinds of important things.

Like the time and keystrokes you save by working with GEM software.

GEM already works with most of the software you already have.



We know what you're wondering. If GEM software is going to change the way you work with your IBM PC, will you still be able to work with your existing software?

Of course.

GEM works with most important programs that work with the IBM PC.

Multiplan." dBASE III.™ Framework.™ And thousands more.

Technically, you see, GEM software doesn't actually change PC DOS. It just

hides it.
So your software works just the way it always has. But without the long and cryptic PC DOS start-up procedures.



But the best software for GEM is GEM software.





The GEM COLLECTION

Now you can work with words and pictures together.

The GEM COLLECTION™ is a bundle of three programs, GEM DESK-TOP,™ GEM WRITE,™ and GEM PAINT.™

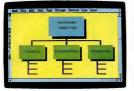
A part of all GEM software, GEM DESKTOP* is the mask that hides PC DOS. It includes the GEM pointer, menu headings, icons and drop-down menus.

So you can point and click your way through anything you'll ever want to use a computer for.

GEM WRITE, by Lifetree Software, Inc., is a word processing program featuring fast, clear and comprehensive editing. It lets you cut and paste, make multiple block moves or even create columns. All without memorizing a single command.

And when words alone won't express what you have to say, GEM PAINT gives you the tools to turn your ideas into pictures. Up to sixteen colors. Paintbrushes, pencils and a straightedge. Plus dozens of shapes and patterns.

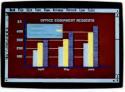
Best of all, GEM WRITE and GEM PAINT work together. So you can work



GEM DRAW
A perfect illustration of the power of GEM software.



GEM WORDCHART Present it with style.



GEM GRAPH
Let's look at the numbers

with words and pictures on the same page.

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Just put your hand on your mouse and point.

GEM DRAW™ gives you all the tools you need.

Like pencils, geometric patterns, a full palette of colors and an extensive gallery of art to use as you like.

And once you've created a GEM DRAW image, you can stretch it. Shrink it. Duplicate it. Or add text to explain it.

GEM WORDCHART™ is the perfect way to make your point in a big way.

With a choice of several type styles and sizes, plus up to sixteen colors, you can build charts that can be read from across your desk or from the far end of the conference room.

And to really drive your point home, your words can be combined with pictures from GEM DRAW.

The business of creating business graphics just got a whole lot easier.

GEM GRÄPH lets you turn numbers into something more tangible. Like pie charts. Bar graphs. Line plots. Even maps. All through the use of simple, well-designed templates.

Where do you get the numbers? Directly from the business programs you're already using, like Lotus 1-2-3, Symphony, dBASE III or what have you.

Where to find a GEM.



In the months ahead you'll be seeing GEM software on a lot of familiar faces. And not just IBM PCs or compatibles.

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And with so many systems working with GEM, you'll soon see important GEM programs coming from a host of other major software houses.

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GEM PRICE LIST \$ 49.95 GEM DESKTOP Available April Available April GEM DRAW 149.00° Available June GEM COLLECTION 199.00 includes GEM DESKTOP GEN GEM WORDCHART 149.00 Available August GEM GRAPH 199.00 Available August Also available: HERCULES GRAPHICS CARD™ \$499.00 PC MOUSE™BY MOUSE SYSTEMS™ \$195.00



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The original idea behind ProKey was a program that would let you store strings of keystrokes you could recall at a touch. Now there's ProKey 4.0 and it's better than ever."

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And all these programs have different complicated commands that are tedious to type and easily forgotten. How much easier life would be if all you needed to operate your program was a small vocabulary of sensible words.

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demand, the more it responds.

"The integration is a real time-saver liks on natural and flexible. You don't have to exit one function before entering another, so I can work with data bases, statistics, spreadsheets and graphics all at the same time—and even incorporate

"With KnowledgeMan, I can keep close track of the sales numbers for each account—when they buy, what they buy and how close I am to meeting my quotas. It's helped me work more effectively and improve service to my

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GEM DESKTOP software looks like an ordinary floppy for your PC. But slide it into your IBM's disk drive, and the change begins.

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Point and click vs. stroke, stroke, stroke.

Next, instead of typing and retyping long file names, you simply point and click again at the appropriate symbols. And voila! Your file appears on screen. But it's not quite the same screen vou've been used to.

guide you effortlessly from one function to the next. So instead of making more complex keystrokes that can easily be mistyped, your IBM PC is easier and faster to use than ever before. There is also a clock and a calculator both built right in.

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Your GEM Desktop includes all operating system interface software and comes with amazingly simple instructions. In fact, GEM DESKTOP software makes it possible, for the first time, for anyone to learn to use an IBM PC. (Who knows, maybe even the most dedicated computerphobes in your company will warm up to the PC, after this.) And you can just as easily justify

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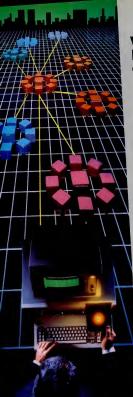
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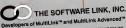
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If Only 'C' ere as Easy as BASIC RUN/C is different. You can write and run your program in tandem. Like BASIC, It

nun your program in tandem Like BASIC It has a couple of dozen commands such as LOAD MERGE SAVE and FILES It has an editor. You can INSERT lines and EDIT lines and LIST and DELETE lines on the spot. The most commonly used are built into the function keys, so you don't have to spell them Then rust say RUN Your program.

cutes instantly If an error hales it, RUN/C explains why and where. You just EDIT the line, then and there, and RUN again.

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If you are already a C user, you If you are already a C user, you undoubselly sense the tremendous time servings of getting out of the computer loop. You've probably been waiting for an interpreter Unitariety, you'll want to hand your work to a computer, for linking, for speed of essection. But RIVING gives yet, a fast from end, it is superit for bilanting away. at a cluster of functions until proven

at a cusper of nuncions units proven indestructible and suitable for acceptance into the Great Project RUN/C less a pro develop and sest code rapedly, without husy checking. No more making things eaths 1dy to Get-Ready-for The-Compiler, where a forgotten semino manua s in the penalty

box. With RUN/C you can try out things devil may care. Let if find your typos and malaprops. I's nothing to change them and re-RUN.

An Ideal Way to Learn If you are a newcomer to C. RUN/C.

making a splendyl teacher its manual is as big as all outdoors. It contains not just instructions how to use RUN/C but its 475-pages provide a thorough-going demonstration of the C language metil Every feature of RUN/C

· all the language keywords like "for" and "while" and "case" • all the built-in functions like "print" and "geto" and "puts" and "malloo"

 all of RUN/C's commands like "EDIT" and "LIST" and "MERCE" . all the data types like "char" and all are presented in a single alphabeacal procession across most of the book

Each is accorded its own micro-chapter with examples of how to use. Own 100 of these chapters are devoted to RUN/Cs built-in functions, and every one lists a sam-ple program showing how it is used. These same programs are on the disk. So as you read them in the manual, you can run then on the screen, see what they do, discover why they do it. And tamper with them, try things out, see what effects your changes

How RUN/C Does It

RUN/C handles the differences between the compiler and interpreter environments with great common sense. As an interpreter, it expects nothing but source, but fincludes can pull in *define and other source code files — functions you have already written, for example, or functions from commercial branes which provide source code, like Preening and BASIC-C. The *ncluded Bies stey hidden. They don't blear your lat-ings. And they don't SAVE with the mean you're working on. No lithering your system with heazerdous copies (no point matricking that "festure" of BASIC).

Or, external files may be MERGEd into your listing at any point — these will display and SAVE with the host file.

The Features Keep Coming The more you look, the more powerful this product gets. It has valuable tracking

toggles to show what's going on behind the scenes as a program executes. Switch on TRON, which displays on screen each line of source code as it executes (interming) with what the program puts to the screen). It shows tust where you were in the If shows just where you were in the program when it departed for the back of beyond. Or my TRACE, which shows the current values of all variables referred to in a source line each time it is encountered. Or turn on PRCN and then

lat a program after a run each line appears with a number as in <12> printf('something'); which says that the line was executed

There is no see the substitute of the control of th directly call for services from the operating system, and then return to your program right where it left off.

Even Shell Capability And more still RUN/C has a SHELL

command which will invoke any operating system command, with both RUN/C and your program still in memory. No need to

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replicate those found in most compiler libraries. So when you compile RUN/C programs, these stanction calls will find inbrary countemparts. As RUN/C favors no compiler, some functions may not be present in yours, or yours may have functions RUN/C does not.

Structures, umons, and instalizees are supported, as well as keyboard and supported, as well as loyboard and screen redirection from and to fine. There are functions to access ports. No extern defensors, and all functions must be included or MERGED — an irrepresely expects everything on board. Typedel and register not supported: RUNC automa-ically senses and uses 8087 meth chip.

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Gone are all those handy string manu-ulators like LEFT\$, MID\$, STRING\$, etc. (although our library offerings add them back). In C. when you reach for even sim-ple irrocations like INPUT or PRINT A\$,X%—well, sorry to disappoint, but underlying such expressions in BASIC if it is to keep its slim profile.
But now comes BASIC-C and all your

old favorates are back. Someone has written the full set of C functions to mamic BASIC's vocabulary, from ABS to WRITE Over 80 routines to open and close files, "field" file buffers, convert their content from and to strings (the CV? and MK? series), peek and poke, print using, clear screen, 'instr', on error goto they're all there. Some have reworked names and syntax to suct C, but all are written as one-to-one functional equivalents to the familiar features of BASIC. And they are documented one to a page in alphabeti-cal sequence like the Microsoft manual

for added familiarity
So with BASIC-C, when you're thinking
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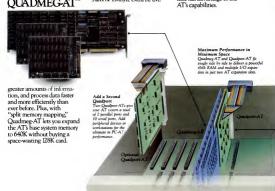
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Lotus & Intel: Power Banking

The power pact sealed, Intel and Lotus are riding high on a new wave of products that will crash the memory barriers of PCs.

BY VIRGINIA DUDEK

NEW YORK-I otus Development has once again broadened its product line and shaken up the industry a bit in the process. A joint agreement with Intel Corporation of Hillsboro, Oregon has yielded the Above Board Expanded Memory Man-

ager products for the IBM PC and compatibles and a new memory-enhancement standard for hardware and software (see "Opening Above Board"). New versions of Symphony and 1-2-3 were announced, as well as a new micro-to-mainframe communications package called Symphony Link.



Above Board comes to the rescue of spreadsheet users who have been complaining that their computer memory is saturated. Presently, a PC's memory cannot exceed the DOS limit

databases. The Above Board can expand the memory limit to 8 megabytes above 640K. Above Boards come with

Compaq's Two New

Computers

print buffers, RAMdisks, and menu-driven installation programs. The Above Board/PC (continued on next page)

Victor Snatched From Defeat

BY CHARLES BERMANT NEW YORK-Victor Technologies took its case to the top of the World Trade Center, announcing that reports of its demise have been greatly exaggerated. Armed with a revitalized product line featuring two IBMcompatible machines, the company that declared bankruptcy 2 years ago hopes to make a much-improved showing in the next round of the PC sweepstakes.

In addition, Victor has filed suit against Tandy, which called the Victor 9000 an "orphan" in an ad earlier this year (see "Who Steals My PC. Steals Trash," Volume 4 Number 9, p.57). Tandy listed the Victor 9000 as one of the machines it would accept as a trade-in. Victor, which says it has never stopped selling or servicing the 9000, wasn't laughing at Tandy's attempt at advertising

While they have written Vic-



of 640K, hindering large appli-

cations of spreadsheets and

The VPC Hard Disk System tor a letter of apology, Tandy has not made the public retrac-

tion that Victor has demanded.

"We have received the suit and

do not believe that the ad was il-

legal," says Tandy senior vice-

president Herschel Winn. "We

(continued on page 50)

BARBARA KRASNOFF HOUSTON-Amid laser lights and music videos, Compaq has

introduced the latest in its line of PC-compatible computers: the Compag Deskpro 286 and Portable 286. The machines are based on the 80286 16-bit microprocessor. According to Compag. they are fully compatible with IBM's PC AT and be-

(continued on some 47)

Power Banking (continued from preceding page)

model comes in two base configurations for the PC, XT, and compatibles and offers up to 2 MB of expanded memory. There is the 64K (with 64K RAM chins) model, expandable to 512K, and the 256K model (with 256K RAM chips), expandable to 2 megabytes.

The Above Board/AT model also has two base configurations for the PC AT: 128K (with 64K RAM chips) expandable to 512K and 512K (with 256K RAM chips) expandable to 2 megabytes.

The Above Board/PC costs \$395 for the 64K configuration and \$595 for the 256K version. The Above Board/AT sells for \$595 and \$995 for the 128K and 512K models, respectively.

Symphony, 1-2-3 (Opus 2)

To fill up all this new memory, updated versions of Symphony and 1-2-3 were announced. Symphony Version 1.1, released in June, can now take advantage of the enhanced memory specifications and address up to 4 MB. Version 1.1 can also interface with the \$087 and 80287 math coprocessor chips. A macro library manager permits users to store macros, numbers, labels and named ranges outside the worksheet.

The new version of 1-2-3 (2.0) will be available this fall and shares some of Symphony's enhancements. Both can use the 8087 math chip, and both use sparse matrix techniques to conserve memory and accelerate operations. Sparse matrix techniques use memory only for the cells that actually contain data.

1-2-3 users will also note that Version 2.0 can read Symphony spreadsheets. 1-2-3 gains much of Symphony's programmability and receives advanced functions such as linear regression. Users will be able to access DOS functions from within the

Lotus also announced Symphony Link, a micro-to-mainframe communications package that provides direct, two-way data transfer between PCs and mainframes. Symphony Link works with Digital Communications Associates Inc 's

IRMA board. Both products run together in the IBM 3270 environment and become fully integrated and transparent to Symphony once they are installed.

Time Will Tell

In the aftermath of the Lotus announcements, observers applauded the Intel/Lotus memory enhancement standards but also looked to some broader moves on Lotus's part.

"I find it fascinating that Lotus is trying to be the IBM of software. " savs Tim Bajarin. vice-president of the microcomputer group at Creative Strategies in San Jose, Calif. Refer-

ring to Lotus head Mitch Kapor. Bajarin adds, "At the same time, if anyone could do it, Mitch and his group of executives can "

Baiarin would also like to see Symphony become easier to use. While Bajarin acknowledges that a product like Symphony cannot avoid a steep learning curve, he believes that the company "still has a lot to do to enhance Symphony to make it user friendly." Scott Smith, vice-president

of the Gartner Group in Stamford, Conn., would also like to see more ease of use in Symphony, "If there were no Symphonv." he asks, "would 1-2-3 have just come in and sold all those units?"

Opening the Above Board

ANALYSIS BY BILL MACHRONE

NEW YORK-Intel and Lotus have taken the wraps off their ioint Expanded Memory Specification and simultaneously shucked many of the memory limits previously encountered by power users. Along with the new standard comes a host of

that far. Intel's first consumer product (second, if you count the 8087 math chip) for the PC is the Above Board. This card packs up to 2 MB of RAM, and two Above Boards can coexist in the same system.

Nitty Gritty

The Above Board card comes with sophisticated software to manage the additional memory.



memory.

new products from Intel, Lotus, and virtually every other board manufacturer. Other software manufacturers should follow in short order. The new specification de-

scribes a method for bank switching, a technique that allows computers to use more memory than they can actually address. Intel and Lotus have placed the standard in the public domain, making it available to all hardware and software manufacturers. This standard expands the PC's usable memory

to 8 MB: however, the first

wave of new products won't go

A menu-driven program takes care of configuration, generatine a driver that ects added to your existing CONFIG.SYS. The board can appear as three different types of memory to the system: conventional memory, extended memory, or expanded

Conventional memory exists below the PC's natural limit of 640K. Extended memory exists beyond I MB and is only accessible by an 80286 running in protected mode, as with the PC AT. Expanded memory is bank switched, or added to the 640K of conventional memory, and is

accessed by the DOS device driver for the Above Board. Only the Above Board/AT has extended memory, but the accompanying software can fully configure either board for an exact match to your system. Intel calls its device driver the Extended Memory Manager or EMM. During installation, this driver makes recommendations as to the best size for RAMdisks and print spoolers for many popular programs. It sets options on the board through software, without DIP switches or jumpers. It even deallocates bad pages of memory after it informs you of the problem. Then the driver strips itself down to the bare-minimum amount of code necessary to run the board.

Intel says that although the standard is geared to solving "large data" problems, the EMM is fully compatible with multitasking systems. Programmers will have little

difficulty adapting their products to the new standard. The calls that invoke the EMM are much like DOS calls, using a software interrupt vector and passing parameters in registers.

Next Step

The new standard is a powerful argument for the continuation of 8088-based PCs. With the recent price reductions in memory and disk drives, PCs are dirt cheap to build. As Quadram president Leland Strange points out, "You can put 640K of memory on a board for the cost of an 80286. Which would you rather have?

Other sources say that DOS 4.0 will bridge the differences between extended and expanded memory, while offering multitasking. Windowed multitasking systems will be relatively simple to build in such an environment

The Lotus/Intel standard solves the "large data" problem, but it is an incomplete solution to the "large program" problem. DOS 4.0, alone with advanced program design, may combine RAM-based program overlays and bank switching with multitasking. This combination would far outstrip the operating environments available in the current market

West Coast Update

PALO ALTO, Calif.-Intel and Lotus Development Corporation held a second press conference on April 24, a few hours after and a continent away from their first one, introducing the Above Board boards and the Lotus/Intel Expanded Memory Specification to members of the West Coast press. The secondary purpose of the event was to sound the trumpet for Intel's Personal Computer Enhancement Operation (PCEO), an Oregon-based division charged with supplying products for the retail personal computer market. Until the formation of PCEO in 1984, Intel was strictly an OEM player. The Above Board/PC and Above Board/AT are PCEO's first major an-

nouncements Richard Bader, operations manager for PCEO, said the Above Board products and the Lotus/Intel Expanded Memory Specification were intended to meet the needs of a growing number of personal computer users for memory in excess of the 640K limit imposed by PC-DOS. Foremost among those needing additional memory, Bader said, are users creating large-scale spreadsheet models and working with integrated software such as Symphony and Framework. He also cited the increasing popularity of memory-resident accessory software, such as Sidekick and Spotlight. as a factor that impels PC users to move beyond 640K.

Accommodation Changes

Jim Kinlan, manager of manufacturing relations for Lotus, announced that Version 1.1 of Symphony and Version 2.0 of 1-2-3 would include support for Above Board expanded memory. The Symphony revision. scheduled to be available in July, would also include 8087/80287 support, a macro library manager, a new utility for file conversion to and from 1-2-3, as well as new documentation, Kinlan reported. The new version of 1-2-3, due out in the fall, would also support the Intel 8087 and 80287 math connectors

Earlier in the day, Microsoft had issued a statement saying that future versions of DOS would be compatible with the Lotus/Intel Expanded Memory Specification

The room at which the press conference took place was ringed with XTs and ATs running large-memory demonstrations in Symphony. There was also one machine running an astonishingly large application in Ashton-Tate's Framework. Ashton-Tate has announced it will market an Above Board version of Framework in the

Compaq's New Computers (continued from page 45)

cause of their 8-MHz capabilities, run software up to 30 percent faster.

The announcements were made in a carefully rehearsed atmosphere of celebratory self-

Sorcim/IUS, vendor of SuperCalc 3, issued a press release congratulating Lotus for including 8087/80287 support in the next versions of 1-2-3 and Symphony (SuperCalc 3 has included support for the math coprocessors since last autumn). Sorcim also let it be known that Above Board sup-

Calc 3. Notably silent this day was IBM, whose TopView integrating environment could benefit greatly by emancipation from the 640K memory limit. IBM

has announced no plans to modify TopView. -Craig Stinson

Rosen. Rosen then summed up his own philosophy. "To succeed in the business and professional marketplace, you must run all of the industry-standard software and you must run all of

monitors; and a security lock. It will retail for about \$4,499 port would be included in the next incamation of Super-

Prime Cuts The fixed-disk Portable holds

640K RAM, two expansion slots, along with the 20-MB hard disk. It will retail for about \$6,299. Both machines can accommodate up to 2.6 MB of RAM, and an optional internal fixed-disk backup system. Other options for the Portable 286 include a 512K upgrade, an add-on 20-MB fixed disk drive. a second 1.2-MB disk drive. MS-DOS Version 3, and a standard 360K disk drive.

The Compaq Deskpro 286, a desktop version of the new computer, features the 80286-based CPU, an AT-compatible keyboard, and an optional 12-inch text/graphics monitor. The machine, which also runs at both 6 and 8 MHz, can accommodate up to 70 MB of optional fixeddisk memory, 8.2 MB of RAM, and four half-height internal



From left to right: the Compaq Deskpra 286 and the Compaq Parsable 286.

congratulations and high-tech entertainment. At an April 30 stockholders meeting at Houston's Wyndham Hotel, attendees were greeted with a well-orchestrated program that included a multimedia rundown of Compaq's 1984 performance, a showing of the "USA for Africa" music video, and the Pointer Sisters.

During breaks in the proceedings, Compag president and chief executive officer Rod Canion, along with chairman of the board Ben Rosen, lauded Compaq's staying power in what was a disastrous year for compatible manufacturers.

Cloning Around "You cannot clone and succeed in this business," asserted

als and all of the industry-standard networks. But you must also have innovative products

with superior performance." Both the Deskpro and Portable 286 machines are being made available in two models: one with a 1.2-MB disk drive and another with a 20-MB fixed

the industry-standard peripher-

disk The Portable 286 Model 1 resembles the present Compaq Portable, including a 9-inch text/graphics monitor and IBMcompatible keyboard. The computer runs at both 6 and 8 MHz. Resides the disk drive it includes: 256K RAM; a real-time clock: three AT-compatible expansion slots: standard interfaces for printers, asynchronous communications, and RGB



storage devices, including a fixed-disk tape backup. The Deskpro Model 1 comes with: 256K RAM, a 1.2-MB high-density disk drive, real-

time clock, five expansion slots, security lock, and all the interfaces that the Portable holds. It will retail for \$4,499 with a monitor. The Model 2 Deskoro comes with: 512K RAM, the 1.2-MB high-density disk drive, a 30-MB fixed-disk drive, and four expansion slots.

Compag also announced

price reductions in its existing models, dropping its dual disk drive portable from \$2,995 to \$2,699, the Compaq Plus from \$4,995 to \$3,999, and the Deskpro Models 2.3, and 4 to \$2,899, \$4,499, and \$5,799 respectively.

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NEWS IN BRIEF BY JANE MINTZER

Big Blue Prints . . . 1BM's new \$549 Proprinter contains less than 60 moving parts, and offers versatile printing capabilities, including APA graphics, multiple foots, and single sheet and tractor form paper feeding. It prints at speeds ranging from 200 cps (draft



IBM's new Proprinter is compatible with the entire line of IBM Personal Computers.

mode) to 40 cps (near-letter quality mode). IBM also announced the Color Jetprinter, a \$745 ink jet color printer capable of text or graphics printing on a wide variety of media. IBM emphasized that both printers are largely compatible with a wide variety of existing IBM PC software.

A Sporty Software Package . . . The organizing committee for the 1988 Winter Olympie Games has chosen Project Software and Development, Inc. (PSDI), of Cambridge, Mass. to be its official supplier of project management software.

PSDI will provide a scheduling program, a project cost program, a graphics package, a relational database, and its QUIKNET instead grated management program to the Winter Games committee. These products will be used in the preparation, staging, and execution of the XVI Winter Olympies in Calgary, Alberta, Camade.

As yet, the organizing committee has not choose an official supplier of hardware, but it will be using a combination of period and computers and mainframes. The organizing committee will use a linear computer and mainframes are considered to the committee will use a involved in the Olympics. A networking system called "OCO-NET" will be established, and by 1986 the committee hopes to provide an one-line information service that will be available to the method of the committee of the committee of the committee of the commoditions in the Clappy and the commodition on a commodition on the commodition of the commodities of the commodities of the c

Fastler Than a Speeding AT Although the power and speed of the IBM PCAT are structure, you migh alwa to wait a while to get your hands on one. In the meantine, Plaemks Computer Products Corporation has a way to speed up the processing power of your PC or XT without removing, replacing, or losing the Bulls CPU. It is now Plasse 286 is an B2026 should add no hourd that allows an 80286 chip to function as the system CPU. It runs at a clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz and MHz fastler than the AT's clock speed of 8 MHz—2 MHz fastler than the AT's clock speed of 8 MHz and MHz fastler than the AT's clock speed of 8 MHz and MHz fastler than the AT's clock speed of 8 MHz and MHz fastler than the AT's clock speed of 8 MHz and MHz and

Pfaster286 uses the PC's and XT's native 8088 CPU to manage the I/O functions while in coprocessor mode. You can bypass the

80286 and switch back to the 8088 mode if your program requires it. Phoenix Computer's president, Tom Stellinger, says that for power PC and XT users, the Pfaster286 is an ideal alternative to buying an AT. "We've developed an add-on solution that brings the full power of the 80286 chip to PCs and XTs without forcing users to give up the native 8088 processor," says Stellinger. The Pfaster286 has 1 MB of RAM but can be expanded to 2 MB. An added option includes an 80287 floating-point processor chipespecially suited for high-speed math calculations.

Pfaster286 with 1 MB of RAM costs \$2,395, the 80287 floatingpoint chip is \$350, and each additional 512K of RAM is \$400. Phoenix expects delivery of Pfaster286 in July.

Further information can be obtained from Phoenix Computer Products Corp., 1420 Providence Hwy, #115, Norwood, MA 02062, (617) 762-5030.

By Any Other Name . . . MSX Corporation of Redwood City, Calif. has filed a suit in Northern California Federal District Court against Mlcrosoft Corporation. MSX is seeking injunctive relief and damages from Microsoft for using the MSX tradenamea a trademark that has been used by MSX Corporation for over 2 years.

MSX Corporation sells and services computers for large companies and also owns the Touch Me Computers retail chain stores located at malls in Northern California.

Monitoring the Problem . . . IBM may have discontinued production of the PC_F this spring, but the smallest PC's sales were so spectacular last fall that Big Blue was faced with another problem. Many customers had PC_F's back-ordered for more than three months, and dealers began and dealers began and dealers began and the problem.

grumbling that they were unable to get the necessary hardware from IBM. Not wanting to renege on its commitments, IBM assured waiting customers and dealers that it intended to eatch up on shipments. Just to prove its sincerity, IBM offered many of its customers the more expensive color RGB display. It was quite a good deal for those who had to wait. This RGB disolay.

placed directly on top of the PCjr.



had to wait. This RGB disolay. designed originally for the IBM PC, sells for \$680. The out-of-stock

PC/r display retails for \$429.

However, if you use your PC/r mainly for game playing, you'll be disappointed by the more-expensive monitor—it does not have the three-voice sounds of the PC/r display, and it should not be

Quadram Calling . . . Quadram Corporation has two new full-length enhancement bounds that will mere the PC into an iningrated voice-data communication management system. The Asher L 1200 and the Asher C2400 each convers with a two-line electroner L 1200 and the Asher C2400 each convers with a two-line electronty of the C2400 each converse and Asher D250, a concurrent with own through the C2400 each communications control with the C2400 each communications control with the C2400 each converse the C2400 each control standard part of the C2400 each conversion of the C2400 each control with the C2400 each control call the C2400 each con-

For more information about both boards, contact Quadram at 4355 International Blvd., Norcross, GA 30093 (404) 923-6666.

Cream of the Crop . . . An electronic information system for the gricultum industry is now available from McI Mail and AgriData Resources, Inc. The new service, called McI Mail for Agriculture, is an extension of AgriData Network—AgriData Resource's electronic information and communications system. MCI by pure mail and Teles services are the newest features of the information system. MCI Mail for Agriculture offers news, weather, prices, and advisory services to farmers and others in agribusiness. . . .

Victor (continued from page 45)

intend to vigorously defend the

Because of a series of bad business decisions, Victor entered Chapter II bankruptey in 1983. Having paid off its debts, the company is now a 90 percent owned subsidiary of Datatronic, AB, a Swedish software company. Victor's facility in Scott's Valley, California continues to operate, however some of the manufacturing functions currently handled there are sched-

uled to be transferred overseas.

The two PC-compatibles, the VI and the VPC, were unveiled at Spring COMDEX. Both the VI and the VPC boast such features as high-resolution screens and high-capacity floppy disk capability. In addition, the company has plans to make its transportable computer, "Vicki," now popular in Europe, available to domestic audiences.

ane to domestic autorices.

Both machines include Victor's enhanced version of
BASICA and Victor-VU, an onscreen guide designed to answer
the questions of a first-time
user. The VI base price is
\$3,795 (\$4,995 with a 10-MB
hard disk). The VPC will cost
\$1,995 (\$3,295 with a 15-MB

hard disk, \$4,295 for 30-MB).
"There has never been an inexpensive Victor," says Marlow. "There has always been a
sense of pride about performance. Now, it's time to announce that Victor is alive.
There will always be one IBM
and one Apple. That leaves
room for everyone else to decide what they want."

Old Vic. New Vic

While a large number of people obviously have not yet decided on Victor, some of the machine's users are avid partisans. Its supporters call the Victor 9000 the Maytag of the PC industry, saying it almost never

needs repairs.
Marlow says the Victor line is
better suited for the value-added
reseller, and that VARs would
be responsible for a large percentage of unit sales. Selling
Victors through retail channels,
as well, figures to be an uphill
battle in a shrinking marketplace.

Xerox Launches Its Office Line

BY CHARLES BERMANT

NEW YORK—Xerox insists that it is not copying anybody with its announcement of a new product line. "Our primary focus is to configure full solutions to customer needs." says Barry Nickerson, Xerox Information Systems marketing manager. "This new line now allows us to fill a customer's needs without any preconceived notions."

Nickerson says that whatever equipment is needed to run an office—from large-capacity computers to typewriters—is now available from Xerox. He adds that the company's ten new products represent the first of four 'waves' of hardware and software expected in the next

two years.
"We're doing as well if not better than 99 percent of the vendors as far as the depth of product line," he says. "IBM is the only other vendor with as full a range.

"They are now at a point where we were a while ago. They are suffering due to a lack of compatibility of products. It's an open race; we can coex-

ist."

Xerox may be pointing its sights at IBM, but there are no plans to copy the product center strategy. The huge Xerox sales force has recently been consolidated in an effort to enhance the goal of selling specific solutions for various office problems.

Product Specific

Among the April 30 introductions is a family of personal computers that are compatible with both MS-DOS and Zerox's own network systems architecture. Xerox's ScreemMare, which provides a Macintoshlike language interface to simplify the DOS command set, is included with every computer. Input can come from the keyhomes. The Xerox PC can be changed into a dedicated word processor through the addition of a special keyboard and custom software. The Xerox PC is manufactured by the Olivetti corporation.

À desktop professional computer, the Xerox 608S, priced at \$4,995, will be offered in network, remote, and standalone configurations. A choice of a 15- and 19-inch display, both significantly larger than a regular PC's display monitor, is also offered.

More than 20 software packages for the 6085, including graphics, spreadshects, file conversion, and mathematic processing programs will be offered. Some other utilities include VP Data Capture, which can take a "snapshot" of mainframe data for manipulation on the PC, and Extended Language Option, which allows the composition of Janances and Chi-

nese documents with the QWERTY keyboard. In addition, Xerox will market two laser printers, designed



Xerox PC 3 come with SCREENMATE

to address the respective high and low-ends of the laser printer market. The 4051 Laser CP, priced at \$4.995, prints ext. grouphics, and data at 10-page grouphics, and that at 10-page prints ext. grouphics, and that at 10-page prints are set of the set

In addition, Xerox has joined with AT&T in the marketing of the Starlan, Ma Bell's version of a low-cost local area network system.

New Scientific Branch Created by Tecmar

CLEVELAND, OH.—Over 10 years ago, a physician named Marty Alpert developed a pulmonary diagnostic instrument and digital-to-analog and analogo-to-digital converter. From those early scientific beginnings, Tecmar was born. Having grown into one of the major manufacturers of peripherals and add-on hardware for the nating in order to once again recomplusize its scientific beginnings.

nings.
President Marty Alpert has
announced that the company's
scientific and industrial products will be manufactured, marketed, sold, and supported
through a new, wholly-owned
Tecmar subsidiary to be called
Scientific Solutions; Inc. Alpert
will direct the new company,

which, like Tecmar, will operate in Solon, Ohio, a suburb of

Cievetand.
Scientific Solutions will take.
Over Teemar's current line of
over Teemar's current line of
all products. These include the
Lab Master Board, which converts a PC into a multifunction
laboratory tool; the Lab Tender
Board, a data processing subsystem for industrial, scientific,
and other laboratory and control
environments; and the Base
Board, which supports digital
customize multifunction boards
by adding up to four modules of
the original control of the control of the
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their choice.

Tecmar officials said they are creating the subsidiary in order to give more focused attention and service to their line of scientific products. — Don Kennedy

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*The Small Computer System Interface (SCSI) is an interface standard that specifies the mechanical, electrical and functional requirements for a small computer I/O bus interface and command set for peripheral devices commonly used with small computers. Javelin features a full range of utilities that allow for flexible expansion with minimal user intervention.

Call or write us for more information, or ask your dealer for a demonstration. Seeing Javelin in action is a breakthrough experience.

Javelin's unique features include:

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- applications

 Reliable backup and restore utility

diagnostics

- Ideal data-base management storage/retrieval device
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The AT's Slipped Disk

OPINION

BY JOHN DICKINSON

It's one thing when IBM produces an uninteresting or ineffective product like the PCjr or PC Portable. That merely hurts the company's reputation as an unbestable marketeer. It's quite another thing when IBM produces a product that is often unreliable, such as the Enhanced PC AT. That can damage its customers' business

When IBM introduced the PC AT, the microcomputer industry was astonished by its unmatched price-performance ratio. The pricing was clearly a marketing decision aimed at quenching competitive fires before the matches were lit. IBM was trying to avoid another Compaq situation. However, it seems this pricing decision also led to the Enhanced AT's reliability problems.

The key, and most expensive, component of the Enhanced AT is its 20-MB hard disk. In order to keep costs low, IBM selected a hard disk manufactured by Computer Memories, Inc. (CMI), of Chatsworth, Calif. Rumor has it that no other vendor would meet the price/performance characteristics IBM had in mind when it designed (and priced) its flagship micro.

Whether that is true or not, the resulting problems have done little to dispel that rumor. The CMI Winchesters suffer from serious reliability problems. Worse, it's not easy to get an AT fixed when things go wrong with the disk. Believe me, I know.

Spare Parts When my AT's CMI Win-

chester started to fail (data disappeared and files became unusable as disk clusters went bad) after 6 months of not-too-intensive use, I called my friendly dealer, told him the bad news, and asked if he had another. Winchester in stock to replace mine. The surprise answer was, "No. IBM has never shipped us the AT Spare Parts Kit."

IBM requires all certified dealers to maintain a spare parts inventory on all machines they carry. It's scandalous that the company has ambushed its own dealers by failing to provide them with the parts they need to meet its own parts stock requirement for the AT.

I asked if a new disk could be ordered. Again, the answer

tory. It too, was removed and sent back to IBM. The third one arrived a week

later and made it through Advanced Diagnostics-well, not quite. One track turned up had. and the technician I contacted suggested I let the diagnostics mark it and see how the disk made out.

It didn't. The next afternoon my word processor lost most of

The bottom line is that IBM is not maintaining the reputation for quality products that has made it so successful in the business world. The company is even denying AT problems.



was, "No, IBM wants all AT parts returned before they'll replace them." IBM is apparently so bent on using its parts inventory to produce new ATs that it only ships replacements on a trade-in basis.

I duly hauled the machine to ComputerLand where the CMI disk was tested using IBM's Advanced Diagnostics (it flunked), removed, and sent to IBM's repair facility in Indiana. Three days later the replacement arrived, and I dragged the AT back to ComputerLand for installation.

A Failing Diagnosis It was a waste of time. This one failed IEM's Advanced Di-

agnostics tests the minute I fired it up. It had six bad tracks that had not been marked at the fac-

a file trying to save it. I ran Peter Norton's Disk Test program, which identified 11 bad clusters. Running Advanced Diagnostics back at ComputerLand (again) showed that 17 cylinders had gone bad-after less than 6 hours of use.

There have been plenty of "authoritative" reasons given in the press about the cause of the AT's disk problems-none, of course, come from IBM. Wherever they come from, my experiences support all of the more popular theories.

Head Aches

The flawed tracks on the first disk were located on the same surface and read by the same head, lending credence to the theory that surface imperfections or head maladies were the ket may depend on it.

cause of the problem. The second one failed in several places, which made the disk controller look like a likely cause of the trouble-another popular theory. When the third one was pulled out, the cables had slipped slightly on the supporting pins on the controller board. supporting the rumor that IBM's specifications for the jacks had been too generous and allowed them to wiggle off and cause problems.

After the first three disks sup-

ported every popular theory about the cause of the problem, the fourth disk got the red carpet treatment: A new controller card was installed alone with it. It would have had new cables too, but none were available. (The new card does seem to hold the cables more snugly.)

So, the fourth CMI disk is now installed. So far, so good, but it's only been a couple of relatively idle weekend days since the cabinet was bolted back on the system. Be-

lieve me. I'm running Disk Test whenever there's spare time and constantly (automatically, in fact) backing up files onto my eternally reliable Iomega Bernoulli Box disks. The bottom line of all this is

that IBM is not maintaining the reputation for quality products that has made it so successful in the business world. The company is publicly denying that there even is a problem with the AT's Winchester disk despite numerous trouble reports in the press and at PC user group meetings across the country. Meanwhile. out of the other side of its mouth, IBM is arranging for new suppliers for AT Winchester disks. All this shuffling and hustling is being done while its AT customers' data is truly in

danger of being lost forever. If IBM can afford to salvage its marketing reputation by giving all PCir owners new keyboards to replace the original "Chiclet" model, surely it can afford to salvage its productquality reputation by replacing all existing AT Winchester disks with something more reliable. The company owes this to its customers and stockholders. Continued success in this mar-

COMMUNIQUES EDITED BY JAMES LANGUELL

PC Protection: Haste Makes Mace

Yuu've shackled your computer with extra locks, chains, and electronic alarms, but you still can't sleep peacefully. Perhaps your fitfull dreams have con-



means of computer security—like a .44 caliber pistol mounted inside your disk-drive slot, cocked, and ready to fire at a hardware thief.

a hardware their. Why not give your computer stronger protection without escalating to deadly force? Interface your hardware with a can of Macc. Try BurglarMist, a non-toxic, CN-type tear gas to supply device the protection of t

company's owner.

"The CN gas won't harm anyone, but it's a shock to someone who's never felt it before." 's aid Romney, who speaks from experience. "It's a peppery kind of thing. Several times the gas fired off in my of-

fice when I forgot to turn off the alarm. The biggest problem each time was losing half a day's work while the air cleared."

The Burglar Mist is available in three models: a mechanical unit (AB 1001, \$34.95) fired by a trip cord, an electric-trigger model (AB 1005, \$59.95), and a time-delay electric model (AB 1006, \$69.95). Either electric version of the Burglar Mist computer protector can be linked to most electric alarm systems.

If you want to arm your PC with Mace protection, be advised that use of this gas is prohibited in several states and cities. It's also illegal to ship the gas through the postal service or by air, so BurglarMist orders must be handled through United Parcel Service. For more information, contact Hillers Sales, Box 425, Drayton, SC 29333, (803) SS3-308.

Boot up, Tune in, Log on, Drop out

We've followed the career of former LSD grus Timothy Leary ever since the days when "control" referred to substances and not computer keys. He was our "People in the News" subject last year when he announced he was launching a career as a program designer. Now the first fruits of his labors have evidently surfaced.

Now the first fruits of his labors have evidently surfaced. Dr. Leary has been conducting seminars designed, according to his press release, to "attain electronic literacy, expand consciousness, and reprogram the brain." These seminars are held in a Masonic Temple.

The third lecture sounds impressive; it's titled "Constructing and Using the Mind Operating System, SKIPI," explained as "offering the Super Knowledge Information Processing Intelligence program as a friendpartner-coach."

Is That a Little Black Book in Your Pocket or Are You Just Glad to See Me?

Cygnet Technologies has created a new "product that will fit in a disk drive and your shirt pocket." Called The Little Black Book. it integrates a program that runs on your PC with a pocket-size. leatherette ad-

dress-book cover.

At the software end, The Little Black Book maintains a 400entry phone and address list, which can include comments on each client, firend, or prospect. What's the gimmick? The program is designed to print out your data in a compact format: a booklet tailored to fit into Cygmet's stylish black jacket.

What's the advantage? A bicoastal executive could print out a different book for each coast. And, whenever you add or delete names and numbers in your life, the disk saves you from facing an accumulation of whited-out corrections and crossedout bad memories.

The Little Black Book, priced at \$49.95, is the first software product to be spun off from the company's computer-telephone-software hybrid, the Cyanet CoSystem toriced from

\$1,495 to \$1,945). The small phone-list program can be run in the background with other MS-DOS programs and used to dial numbers automatically if you have a Hayes-compatible modem or Cygnet's \$69.95 dialer board.

Why not stick this data in your pocket: Cygnet Technologies Inc., 1296 Lawrence Station Road, Sunnyvale, CA 94089, (408) 734-9946. And, let's have lunch sometime, Okay?

Go Ahead-Make My Trade!

Savvy investors seem to live by the creed "nice guys finish last," and they make no bones about it. At least that's the tough image reinforced by two rather vicious names—Revenge and Shark—picked by software companies that are vying to conquer Wall Street.

Shark is the name of a "quote processing" system that offers traders real-time stock prices through their PCs. It's obvious that Walsh, Greenwood Information Systems, Inc., of New York City didn't hit on this aggressive name through some accident of acronym. The company flaunts the killer fish in ads

featuring Jaws-style graphics

and slogans like, "You tell

Shark your strategy, Shark tells

you when to strike

The company even sends out its press releases with $3\frac{1}{2}$ -foot inflatable sharks. (One PC News reporter uses the shark to discipline her cats.)

Although Revenge Software Inc. sounds rather sinister for the name of a maker of investment programs, Herbert Mayer, vice-president of Revenge, claims that the name was drawn

from an innocent proverb: "Living well is the best revenge," coined by poet and

preacher George Herbert.
Even so, Mayer confessed
that he hopes the name Revenge will trigger other ideas
in customers' minds when they
see the company's Option Valuator software (\$145). "Most
amateurs who invest in the options market don't do very



Real Quests: The Antidote for Computerization



rience the excitement of some real-world adventures.

King's Ouest, released last year on disks and cartridges for the PC and PCir. is an impressive animated adventure game, combining graphic dexterity with narrative eleverness, Sierra On-Line continues this adventure in a new sequel. King's Quest II: Romancing the Throne (\$44.95)

The first player to contact Sierra On-Line after solving the game to earn the highest possible score (185 points) will be the winner of a real-life adventure. The Best Quest Competition offers a choice of thrill trips, including a spelunking expedition, river rafting, ballooning,

or mountain climbing. For more information, write

to Sierra On-Line, Coarsegold, CA 93614 Another computer game,

Golf's Best (\$49.95), is based on a real-life model-the Pinehurst No. 2 Course in North Carolina, created in 1901. The Golf's Best player with the best score as of May 31, 1985, will have a chance to see how the software's simulation compares with the real fairways and greens when I Step Software sends the winner and three friends to the Pinehurst Hotel and Country Club for a 3-day golfing holiday

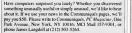
The company's second computer-golf tournament is already underway. Players of Golf's Best can send their top scores on diskettes to 1 Step Software. Charlotte Plaza #1300, Charlotte, NC 28344.

Joystick Is Optional

Relax, everybody! Artworn Software in Fairport, N. Y., has finally released what the company calls the "eagerly awaited Strip Poker for the IBM PC and PCjr computers . . . [In its Apple and Atari versions! this classic program has been entertaining men and women with a variety of computer opponents-each with his or her own

style of play, personality, and comments." If the prose of the press release isn't outlandish enough, you're invited to give the game a try, where you'll be playing against two female opponents. Three other data disks are available, two with more female onponents and one with men. The

latter, evidently, is a kind of Poker à la Chippendale's The game sells for \$39.95, with data disks costing \$19.95. Anyone who is genuinely interested in getting naked with his or her PC can call (800) 828-6573 for more information.



well. We'd like people to think they can use our program to get revenge on the market for not letting them succeed in the past

If you'd like to take out a contract on this program, contact Revenge Software Inc., P.O. Box 1073, Huntington, NY 11743. (800) 642-9606. Or. for a taste of Shark, contact Walsh, Greenwood Information Systems Inc., 180 Maiden Lane, New York, NY 10038, (800)



Everything but the Kitchen Table

It's a sad fact that many computer companies so belly up even though they create fine and useful products for the personal computer consumer. How refreshing, instead, to read about a company that is still around, challenging the marketplace by making useless, defective, and disruptive hardware and software.

The history of such an innovative (albeit mythical) company, Kitchen Table Inc. (KTI), is chronicled by David D. Busch in Sorry About the Explosion: A Humorous Guide to Computers. published by Prentice-Hall, Englewood Cliffs, NJ 07632, with a cover price of \$7.95.

The star of KTI's applications programs is Word Whacker, a WordStar workalike that even includes MicroPro's wellknown copyright notice on some screens. On the lighter side. KTI ground out hundreds

of forgettable adventure games. such as Haunted Delicatessen. Mood Ring, and Savage Bus

KTI's contributions to systems software include ?BASIC -an enhanced misinterpreter that incorporates the MAYBE logical operator and powerful new random commands, such as "IF . . . THEN . . . RND -if the expression is true, do

something unexpected." As a bonus, Busch's 152page book provides PC and PC/r BASIC source code for several pieces of KTI software, including the PP/M operating system, a random sort, a random BASIC program generator, and Mean ELIZA, a computerized psychiatrist that automates abuse therapy. "Got any more ideas in your slimy mind?" is a typical Mean

ELIZA input prompt.



BUYERS GUIDE TO DESKTOP ORGANIZERS

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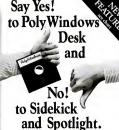
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DOES WORKING ON LOTUS 1-2-3 MAKE YOU SEE RED?

Granted, Lotus 1-2-3" can be a fast spreadsheet. Except when you first buy it, take out the five floppy disks, study the manual to figure out which ones do what, put the plastic doohickey over the keyboard, and begin reading about all the installation procedures you need to get the thing up and running.

Or if you never make a circular calculation (any simultaneous equation, even something as simple as "bonus equals 10% of profit after bonus") when doing a complicated spreadsheet.

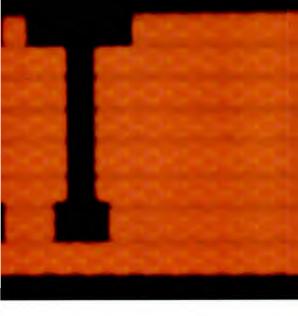
By the time 1-2-3 calculates it correctly, you may have retired.

Or if you'd like to plot your data with a single keystroke, because it can take several minutes (including a disk change) just to start the process.

Or if you'd like to quickly create a file directory under program con-

trol. 1-2-3 can't do that at all. What's the point of all this? We'd like you to go down to





your software dealer and see a new product called SuperCalc* 3 Release 2, which, unlike Lotus 1-2-3, does all of the above.

all of the above. Along with a larger spreadsheet. Vastly superior graphics. Incredible speed (that becomes even faster when

used with the 8087 or 80287 math co-processors, which 1-2-3 doesn't support). And more. For a lot less money. All on one disk that you can run right out of the

All on one disk that you can run right out of the box. (Our lawyers want you to know we include an additional formational, let SuperCalc in a registered modernark of Computer A reference of the Schwarz for.

tional file disk. Which also contains the popular printing program Sideways", so you'll never have to cut and paste wide printed reports together again. Unless you

use 1-2-3.)

But don't believe us about all this. Go take a look.

After you do, one thing should become obvious.

What are you

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PEOPLE IN THE NEWS

BEN ROSEN: Money Makes His World Go Round

BY JARED TAYLOR

In the high-flying world of venture capital, Ben Rosen is one of the highest flyers. Although he came to the venture business late in his career, he has already backed two of the fairy-tale success stories of the microcomputer era-Lotus Development Corp. and Compaq Computer-and he has his eye on still more prospects.

Constantly on the move between offices in New York. Sunnyvale, Calif., and Dallas, Rosen slowed down just long enough to talk to PC about his

Born in New Orleans in 1933. Rosen was first trained as an electrical engineer. "That was before computers," he says. "I studied conventional vacuum tube engineering." After a stint as an engineer, he went to business school and then to Wall Street as an electronics industry analyst, a move that gave him a chance to combine his interests in business and finance with his electronics background. Before long, Rosen had a loyal following and started keeping investors up-todate on the fast-moving computer industry with the Rosen Electronics Letter.

Entering the Ring

Then, after 15 years as an industry-watcher, Rosen decided to jump into the ring himself. He teamed up with L. J. Sevin. the founder of Mostek, to put together a venture fund. "Our combination of his inside experience (in the electronics industry) and my outside experience were what we tried to use to offset the fact that neither of us had been in a venture capital firm, says Rosen.

The combination worked. The two men scraped together \$25 million and in 1981, Sevin Rosen Management Company

It wasn't long before the partners started doing things right. In March, 1982, the partnership invested in Compaq Computer and closed a deal with Lotus just one month later. The success of these two companies surprised even their backers. Compag's er," says Rosen, "you can generate hundreds of millions of dollars in the first year or two." Of course, Lotus and Com-

pag had more than good timing. They had all the ingredients Rosen looks for in a deal. He makes the following computer logic metaphor: "Success in this market is an AND gate, and there are five inputs-the right marketing strategy, the right product strategy, the right man-

"Success in this market is an AND gate, and there are five inputs—if you're missing a single input, no signal comes out."

founders forecasted wildly ambitious sales right from the start. "We didn't believe them," says Rosen, "Apple did \$800,000 its first year and \$8 million in its second year, and here Compaq was forecasting \$30 million for its first year." Rosen pauses and smiles. "They ended up doing \$111 million.

Lotus Blossom

If anything, Lotus was a bigger surprise. Its first-year sales forecast of \$3 million was way off. The company did \$53 million, "That's 17 times more than forecast," marvels Rosen.

Both companies caught the wave at just the right moment. As Rosen points out, when Apple and Microsoft first started. the market for micros was young. They couldn't grow any faster than the market. But by the time portable Compags and 1-2-3 spreasheets went on sale. demand for personal computers was insatiable. "If you have the demand on one side and the production capability on the othagement, the right execution, and the right financial resources. If you're missing a single input, no signal comes out."

Stable Record Plenty of established comput-

er companies with far more resources than Compag failed with their micros because they didn't have all five inputs. "They've all found ways to snatch defeat from the jaws of

victory," says Rosen. Sevin Rosen Management hasn't always scored either. The company invested in one of the computer business's best known failures: Osborne. It has also written off its funding for ComputerThought Corporation, a software company based

on artificial intelligence concents. "They were a little ahead of their time," says Rosen. But no stable of horses can be all winners, and Rosen is busy grooming next seasons champions. He argues that Compaq and

Lotus were unusual, not for their success, but for how quickly they were successful.



He has invested in at least two other companies for which he promises "near-term superstar status." One, Convex Computer, makes machines that are about one-fourth the speed of a Cray supercomputer 'but at one-tenth the cost and one-tenth the power consumption." Another, Cypress Semiconductor, builds CMOS chips that Rosen calls "the fastest semiconductors in the world."

Sevin Rosen Management

Out on a Limb

has even gone out on a limb and invested in yet another software startup, "We didn't think we were going to do any more software investments because the noise level and cost of entry are so high," says Rosen. But he and his partners got "personally enthused" about this product-tentatively called ANSA-and took the plunge. Rosen, who has seen too many great promises dissolve into vaporware, won't talk about the new package. "We're not going to say anything until we're ready to ship," he says.

Though Rosen spends most of his time watching over the comnanies he has already backed (he's on the board of five of them), he is always on the prowl for a new deal. He estimates that his firm, which has now grown to six partners, will look at 1,000 deals this year. Maybe five will

Ben Rosen is a busy man, but he likes it that way. "This is actually my fifth career," he says, "I was an engineer, a consultant, an analyst, I did the newsletter, and now I'm a venture capitalist. This is by far the most stimulating and exhilarating."

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DOWN TIME BY WINN L. ROSCH

Wrist Computers: Wearing Your Screen on Your Sleeve

A historical precedent, an air of inevitability, and a certain degree of hype have all contributed to our expectations of eversmaller computers. The trend was well established by the time the room-filling faira strank to the size of a desktop PC. Now, most people expect that someday they will be able to hold a complete computer, no bigger than a half-dollar, in the palms of their first of the size of their first of their f

of their hands.

I could do that today if I weren't already wearing it around my wrist. Selko—the famed watch company that also quietly dabble in a wider range of electronic geograws—sells a pair of wrist-worn wonders: the UC-2000 wrist information system and the RC-1000 wrist terminal. In essence, they're both compaters, and one of them could realistically rate as the world's smallest PC compatible.

Small Concessions

As Seiko honestly admits, however, these digital delights don't yet rival the power of your PC, but they do act as personal terminals. Even in that role, they are one-way gates, almost what engineers might call write-only memory. Both are limited to re-

Seiko UC-2000 Wrist Information System Seiko RC-1000 Wrist Terminal Hattori Corp. of America Consumer Electronics Div. 1330 W. Walnut Pkwy. Compton, CA 90220 (213) 603-9550 List Price: UC-2000 with controller and printer, 5340; RC-1000, 5149. Requires: RS-232 serial

port for the RC-1000.

ceiving data—the RC-1000 from your PC, and the UC-2000 from its own, detached keyboard.

Besides normal electronic watch innards, each Seiko is packed with 2K of static RAM. Their LCD displays are only windows that let you peek into their data silos to keep track of impor-

the Seiko's memory is equivalent to.

The RC-1000 is a well

The RC-1000 is a well thought-out PC-compatible add-on. Plug its connector cable into your PC's serial port, run Seiko's software, and key in your favorite facts. Up to 80 24-

Seiko has earmarked wrist computers as high-tech toys for upwardly mobile professionals who want to impress their peers.

tant appointments, phone numbers, recipes, and rejoinders.

I suspect that Seiko knows its market and has earmarked this twosome as high-tech toys for upwardly mobile professionals who want to impress their peers. The twins may fail there because getting full propaganda value from the watches may require you to make up for their size by being overly conspicuous about your consumption. The Seiko computers are so neatly packaged as wristwatches you'll feel compelled to arise from the table in your favorite mesquite cookery and intone Tarzan-like, "Well, according to my wrist computer. I see that it's time for my next very important appointment with the chief executive officer of a major blue chip corporation." If you're not careful, someone may doubt your sincerity.

Toying with Technology

Utility aside, a close look at these timepicces reveals each to be a genuine technical tour deforce. Each watch contains a calendar, clock, support circuiry, and RAM in a space not much larger than the commercharacter entries can be stored inside and displayed one at a time on its two-line, 24-character LCD readout.

The UC-2000 becomes an enire computer system—complete with Microsoft BASIC, a calculator, and a text editor. Jolaying it atop its pocket-computer-size keyboard-controller (model UC-2200). Without physical connection, the watch then acts as the controller's memory repository and 40character display.

Alas, that 's 40 characters total—four lines of ten columns each, not quite enough for composing your next novel. Probably to save RAM requirements, the display is character oriented rather than bit mapped. However, it's rich enough in extra symbols to make three complete alphabets of different sizes with some extra icous to some.

Though a clever and appealing plaything, the UC-2000 system rates poorly as a computer,
even compared to \$100 handheld models. It's extremely
slow, and—yawm—if you
thought the PCjr's keyboard
was bad, Seiko's takes the big
step from purgatory to hell. The



keys are too tiny to be called Chiclets and too unreliable to be called anything not profane.

Let's Get Small

However, comparing either wristband to a handheld computer is blatantly unfair. These wonderful watches are obviously not made for normal number crunching or word work. Both are special-purpose machines that incidentally point out the fatal limit of computer miniaturization—the human interfas.

As machines get smaller, the problem of information transfer grows larger. You want a screen large enough to see, and a CPU large enough to really use. Neither of these miniaturiza-

tion problems will be solved for PC-like machines until thoughtwaves can be directly read by a computer and images can be projected onto your retina. But this doesn't mean that there's no hope for the wrist computer.

These Seikos are but a single step from being genuinely useful. All they need is the capability to be loaded with programs instead of words. Given this, these electronic bracelets might start growing under pin-striped sleeves faster than worms under

Once such wrist computers catch on, they may start a whole new spate of miniaturization—and maybe a new trend in hightech jewelry. Who knows what's next—earring, tie-tack, or even pinkie-ring computers.

Yet the acceptance of such new machines will bring another flurry of problems. You won't just have to worry whether your new computer is compatible with your present software, you'll have to be sure it's color coordinated with your wardrobe too.

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Many were fine packagesfilling niches, stop-gapping problems, allowing the businessperson to maintainprobably not drop behind, but definitely not surge ahead.

What was missing from these packages varied from package-to-package, Some lacked power. Some, simplicity. Others, clarity. Most lacked real integration.

Introducing Some Old Software

During those ten years, Mini-Computer Business Applications, Inc. (MCBA), was quietly establishing the standard for Business Applications Software for minicomputers.

Today, much of the new software developed by other companies boasts compatibility with MCBA's packages.

Macola, Inc., finding the current micro-packages unacceptable against the standards they

involved in developing their own set of packages, approached MCBA, obtained the rights to convert the powerful mini-

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THE SHORT REPORT BY PHIL WISWELL

Prime Picks of the Professional Programming Litter

Accountability: Prospecting

Improving the efficiency of sakes work demands a fast, fool-proof way to manage product and client information, and 'two found one. 'You'll have to dig deep in your pocket, but you'll find the return worth the investment with Accountability.' Prospecting (Key Systems, Inc., 512 Executive Park, Louisville, KY 40207; 5640 plus \$3.50 handling; for PCs, XTs, and compatibles; requires 128K, DOS 2.1

Prospecting is a sales, marketing, and after-sales support tool, that is adaptable to any business. Specifically, it's a prospect/client database with a useful set of analytical tools. Twenty-six user-defined data fields are available for descriptive information, and nine product marketing categories yield another 63 potential fields. A powerful targeting command makes short work of finding specific records and generating reports to either screen or printer. Prospecting also prints personalized letters, mailing labels, and index cards.

All Purpose Calculator

Many people with computers on their desks find no room left for calculators. And some don't like the way traditional calculators make you work. They think you should be able to type 150+ (TAN(45DEG)CON-TROL3*(PI*17.514))/c and mow you can, with the All Purpose Cokulator.

The calculator's company, Peerless Engineering Service, calls its product a calculator for people who "think reverse-Polish notation is what Lech Walesa uses to send secret messages." Tougue-in-check maybe, but true because you made calculations with All Purpose





Calculator (up to 64 characters) much as you would speak them. A full range of trigonometric functions is available along with six constants and 20 on-screen programmable memories (Peerless Engineering Service, SIPS Soquel Dr., Soquel, CA 95073; \$29.95 plus \$2, 50 handling; requires 64K RAM, DOS 2.x).

The Decision Maker

What a calculator can't help you figure out, such as filling a chair on your board of directors or choosing a distributor for your products, The Decision Moker can.

Basically, The Decision Maker asks for the pertinent information about a situation or individual, then weighs the problem for you by scoring each alternative.

The program divides your criteria into limits, on which you will not compromise, and desirables, on which you will, forcing you to assign point values and orders of importance. Then it ranks your candidates and delivers a report containing any or all sections of the decision-making process. This allows you to go back and make changes easily. The Decision Moker (Alamo Learning Systems, 47 Quail Court, Suite 300, Walnut Creek, CA 94596; \$250 plus \$2.50 handling; for PCs, XTs, and compatibles; requires 96K RAM. DOS 1.e) is a valuable tool, and it's not difficult to master, still, you do most of the work.

Executive Filer and Executive Writer

Executive Filer is a file manager quite different from most because it was designed to store and retrieve documents and eraphics rather than data. Though it can be used alone to capture and store graphics from other programs and ASCII text from other editors, Executive Filer was meant to be used in conjunction with Executive Writer, I say that with certainty because the two programs used to be sold as a single product called The Ideo Processor. Executive Filer and Writer not only lack fresh design, but were not reworked enough from their unsuccessful ancestry to be worth the lower price. Both offer plenty of features and good on-line help, but the interface is clumsy and commands are difficult to remember. But beyond

filing documents. Executive Writer is a full-featured word processor, modeled in many respects after dedicated Wangs. Each document is coded with up to ten keywords. So you could query Executive Filer for all reports about microcomputers that mention network sharing and/or multitasking that were generated by three researchers in March, and so forth. The ability to store business charts, soveadsheets, and graphics generated by other programs is the most endearing fea-

these complaints lies an inter-

esting system for creating and

ture of the Executive Filer and Executive Writer (Paperback Software, 2612 Eighth St., Berkeley, CA 94710; 349.95 and \$69.95; for PCs, XTs, ATs, PCJrs, and compatibles; requires 128K RAM, DOS 2x).

Stock Record-Query-Portfolio Manager

Stock Record-Query-Portfotio Monager is a set of three powerful 1-2-3 templates (also available for Symphony) that record and analyze stock and bond issues. The number of issues you can track depends on memory and frequency.

The Stock Record program is the database of stock histories. and it provides complex analysis and graphing of stock performance. Ouery compares and sorts this data. And Portfolio Manager records transactions, providing detailed summaries, statistics, and tax information. It calculates commissions, return on investment, gain/loss, and interest on margin automatically. Using Lotus's Table function, it's a snap to model the performance of a purchase at different prices. Stock Record-Query-Portfolio Monager (MicroRealities, Box 60123, Grand Junction, CO 81501; \$125 includes handling; for PCs, XTs, ATs, PCjrs, and compatibles; requires 256K, DOS 1.x) ends up automating much of 1-2-3. but it requires intermediate to advanced experience with the program.



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IBM's Screen Star Shines

PRODUCT REVIEW

BY DARRELL PLANK

Ever since IBM released the PC, there has been speculation about the accompanying color board that was sure to follow. After all, there was plenty of power in the new machine to handle something more exotic than the color/graphics adapter (CGA) released with the PC. At long last, IBM has announced two new color/graphics boards and accompanying high-resolution monitors. The results have been worth the wait.

One of the cards, the enhanced graphics adapter (EGA), is not as flashy as its big brother, the professional graphics adapter (PGA), but it's more upwardly compatible with previous graphics cards and easier to use for interactive graphics applications. This compatibility and flexibility, plus a much lower price tag, will make the EGA the card of choice for most users looking for higher powered graphics.

Distinct Advantages

The EGA can handle the standard IBM RGB monitor or the monochrome monitor in any of the modes currently available. Most applications will continue to run under the new cards just as they did with the old CGAs and monochrome adapters. However, the EGA doesn't

have an MC6845 chip. This chip is the workhorse of the CGA, and to maintain compatibility, the EGA has to simulate its function. The simulation is not exact though, so some graphics programs that write directly to the 6845 chip won't work on the EGA. Changes to make such programs EGA compatible should be fairly simple, so expect to see upgraded, EGA-compatible versions of these programs soon.

Added Features

While it's comforting to know that existing applications will still run on the EGA, the real promise of this card lies in its new features. If you have an RGB monitor and are tired of the two color sets available on the standard color adapter, take beart-the EGA allows 16 colors at both 320 × 200 and 640 x 200 resolutions. The EGA also supports graphics on the monochrome monitor with a resolution of 640 × 350 and four colors. Four colors? Yeswhat the rest of the world sees as

blinking, intensified, black, and

the most discerning and sensitive eyes.

Sixteen colors can also offer a pleasing alternative to white on black. By replacing the BIOS, the EGA ensures that these characters are always used in text mode so that DOS and several text-based applications will automatically take advantage of the new sharper text. This is a welcome improvement for those of us who appreciate color

Given the choice of 640×350 , 4-color mode, and 640 × 200, 16-color mode, some developers will be forced to choose the lower resolution. Expanding the FGA to 128K eliminates this problem and allows the full 16 colors.

Leading the Pack

Technically speaking, the EGA has some features that place it far ahead of most color cards. The EGA creates colors by writing to color planes. Color planes can be thought of as several screens superimposed



ors. Unfortunately, the EGA is incompatible with the Hercules card, which also supports graphics on the monochrome

screen. Any programs created specifically for Hercules will not run on the EGA with a monochrome monitor.

Shining in Color Although the EGA certainly

enhances a standard RGB display, it really shines with the new IBM enhanced color display, which was designed specifically for the EGA. While the extra colors on a standard display are fun to look at for a while, the same fuzzy characters that have always plagued the RGB monitors can make the eyes start to water after a full day of staring at the screen. The enhanced color display takes care of all that. With a 640 × 350 resolution and an 8 × 14 character box, the letters are

crisp and clear enough for even

but aren't ready to sacrifice our evesight for it.

The EGA comes with a standard 64K of memory on board. An ontional extra memory board can be piggybacked onto the EGA card, totaling up to 256K and still taking up only one slot. In most cases, this memory simply adds video pages. Typically, this does not affect the usability of the card since so few applications take advantage of pages.

The Full Spectrum

However, there is one situation in which the extra memory might be worth the additional cost. As mentioned previously, there are up to 16 colors available in the 640 × 350 graphics mode. However, if the EGA only has 64K, only 4 colors (black, red, white, and blue) are available. Additionally, certain technical limitations make it difficult to perform some screen

operations quickly in this mode.

onto each other. Colors are created by writing different values to the different screens. Unlike many color-plane systems for which data has to be written once for each plane, the EGA can write to several planes simultaneously. Many applications run just as fast on the EGA as on the CGA, in spite of the fact that four times as much data is being written. In fact, the EGA doesn't require the processor to wait for the video to access memory; therefore, many applications will actually run faster on the EGA.

Icing on the Cake

In addition to the new modes, the EGA offers other features that are not immediately evident but will probably show up in interesting ways in future soft-

Smooth scrolling, loadable character fonts (with any character box size-I have my mon-(continued on next page)

PC UPDATE BY VIRGINIA DUDEK

NEW YORK - Major enhancemente to Lorus's two breaddrinners, 1-2-3 and Symphony, have been announced. Symphony 1.1 is now available enhancement. Symphony 1.1 is now available symphony to recognize the presence of a seacry enhancement board. (See the Lotus/ intel stories this lesse of Powers,) More manager, and 8007/80287 coprocessor support have also been maded. Lotus slee premises a simplified intellintion program and new

-2-3 makes its entrance this fall with enhancements similar to those for Symphony. Users can expect support for sxpanded memory specification and the 8087/80287, access to DOS, linear regression functions, and more macro commands. Both Symphony and 1-2-3 files will be compatible with each other.

Symphony upgrades are free to users who purchased the ooftware after April 24. If purchased before April 24, upgrades are \$15.1-2-3 are also free for purchases made after April 24. Programs purchased before April 24 and be upgraded this fail. Lotus will distribute both upgrades.

MicroPROPRITY Version 5.11, a financial planning and nodeling system from Vis no Computer. Inc. in son Disgo, Calif. Is now the computer. Inc. in son Disgo, Calif. Is now the computer of the

Ow-priend deskrop utilities abound now that Bellect, Inc. of Bellevue, Neah, has lowered prices on its Pop-up software. The Pop-Up Desktat, which consists of a calennow of the property of the property of the tor, enew DOS utility called Anything, and a eutomatic telephone dialer, now sells of 589.85. DeskSet Plus has an additional telecommunications mackage and sells for \$120.

Some short takes: Syagen, Inc., of Fremont, Callf., has enhanced the Syages 5.01 supports PC-DOS 3.0 and performs image backward to the state of the

Be a contribator to PC Update. Write or call Virginia Dudek, PC Magazine, One Park Avenue, NY, NY 10016 (212) 503-5265.

Screen Star (continued from preceding page)

itor set up to show 43 lines in high resolution text mode by using 8 × 8 characters), split screens, and 256 colors (only 16 on the screen at a time) are only some of the goodies available for the enterprising developer.

While the EGA is an exciting new card with a wealth of possibilities for creative developers, it does have some flaws. One of haps some of these glitches have been worked out since the early versions of the EGA. Some of the problems I witnessed were on a prototype card, but they seem to have disappeared in retail versions.

Another minor problem is that there is no composite color output from the EGA (although there are a couple of composite



these is the presence of to many write-only registers. Most of the EGA's registers cannot be read, so some tasks are very difficult. For instance, suppose a mouse driver puts a cursor on the screen. To do this, the driver must set the registers properly, write to the screen, and then rewrite the registers to . . to what? Since the registers can't be read, the mouse cursor can't know what their original contents were unless some special.

allowance is made (for example, a special mouse driver).

Structural Problems

Although technically elegant, some EGAs seem structurally unsound. On some cards, a snow appears in certain colors, and I have beard of more serious problems. However, after seeing several cards installed, I have yet to see many serious problems. Per-

jacks on the back mysteriously marked "reserved" in the documentation). This means that you can't run your standard color TV or composite monitor from the EGA. On the other hand, the advantages of the EGA would be lost on anything less than an RGB monitor, so this is really not much of a problem.

The EGA is an excellent addi-

tion to the IBM set of display adapters. As the new IBM standard, it's a sure bet to become the insultry standard as well and inspire a large base of software to support it soon. The EGA is a welcome relief from the mediocragraphics capabilities IBM has offered so far. I think that in the months abead, the consensus will be dual the EGA is the kind of of the exciting possibilities we all associate with personal computers.

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15-18

The National Cumputer Conference sponsored by AFIPS, Association for Computing Machinery, Data Processing Management Assoc., IEEE Computer Society, and Society for Computer Simulation. To be held at McCormick Place in Chicago, III. The theme for the conference is "Technology's Expanding Horizons," For registration and information call (800) NCC-1985

AUGUST

19-20 Future Computing's Graphics Forum and Seminar. To be held at the Hyatt Regency Embarcadero in San Francisco. Overview and forecast of personal computer graphics marketplace. Contact: Future Computing, Inc., 81111.BJ Frwy., Dallas, TX 75251, (214) 437-2400,

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UNIX EXPO. To be held at the New York Hilton and Sheraton Centre Hotels in New York City. A UNIX operating system exposit for manufacturers, OEMs, VARs, ISOs, and end-users. Sponsored by National Expositions Co., Inc., 14 W. 40th St., New York, NY 10018, (212) 391-9111

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15-18 COMDEX/Europe. To be held at the RAI Congress and Exhibition Centre, Amsterdam, the Netherlands. Will feature hardware, software, peripherals, and other related items. Presented by The Interface Group, 300 First Ave., Needham, MA 02194, (617) 449-6600.

Computers in Education, To be held at the Sheraton Centre Hotel in New York City. Trade show devoted to education applications, hardware, and software. Contact: Conference Management, 17 Washington St., Norwalk, CT 06856-4990, (203) 852-0500.

Radio Active Computing

BY JAMES LANGDELL LOS ANGELES-Somewhere

between Easy Listening and FM-Rock, there is a new alternative for radio listeners here. You might not expect PCs to have much to do with such a low-tech medium as the radio, but a tasty computer-radio combo has been cooked up in Southern California at the kitchens of "The Famous Computer Cafe."

'The whole idea of our shows is to expose the human side of personal computers," said Mike Walker, who hosts "The Famous Computer Cafe" along with Ellen Lubin and Andrew Velcoff. The show's emphasis is "not so much on technical bits-and-bytes information as on the unusual and extraordinary ways people utilize this technology to do what they do. Rather than asking retailers questions, our listeners can go

right to the source. Industry figures such as IBM's Don Estridge, Microsoft's Bill Gates, and Atari's Jack Tramiel have been interviewed on the show. "The Computer Cafe" has also been visited by computer users who are celebrities in other fields. Past guests have included Herbie Hancock, Edwin Moses, Timothy Leary, Jack Anderson, Frank Herbert, Ray Bradbury, and Donny Osmond. Over 300 half-hour interviews have been broadcast on the daily show. which is heard on station KFOX

in Los Angeles.

Chip Chat

These interviews are conducted in a fictional restaurant. The Famous Computer Cafe.



Serving up divital delicacies, from the up: Andrew Velcoff, Ellen Lubin, and Mike Walker.

To make technical subjects sound less intimidating, Walker explained, "We talk about computers the way people talk about them over food." To cre-

ate a culinary ambiance, the producers occasionally use sound effects to make it seem like a waiter comes by to pour ice water and serve dishes, but the interviews are often held in restaurants. The relaxed attitude is appealing. "Listeners call up and want directions on how to drive to The Computer Cafe for dinner," he says.

'The Famous Computer Cafe** also hosts a live call-in show in Los Angeles on KIVE (870 AM) at 3:30 p.m. Callers can pose technical questions to Dr. Disk. a fictional expert with a gentle bedside manner, "Wheneyer he gets too technical, there's a Techno-Alert, Walker said. "A horn beeps, warning Dr. Disk to back off a little and ex-

plain what a megabyte is." Table Talk

The Gamemaster is another personality that dines at The Computer Cafe. "He's more intense-totally into computer games,'

explained Walker. "Listening to him talk is like hearing about a foreign land." To keep the show light and lively "The Cafe's" hosts give away prizes of software and hardware and break up the talk with interludes of popular music. "No heavy rock," said Walker, "The music's designed for a Yuppie crowd. Some listeners call up just to ask, 'What

was that song you just played?"

The newest branch of "The

Famous Computer Cafe" is heard nationally on the National Public Radio network. It's a weekly magazine-style program, mixing interviews, product reviews, and feature stories in each half-hour. To find out if you're within earshot of "The Famous Computer Cafe." contact SOFTV Inc. 1322 Second St. #24, Santa Monica, CA 90401, (213) 394-7242.

Morrow's Little Maroon Maxims

Now that the Peoples Republic of China has turned away from the Cultural Revolution and bought into capitalism, it might be seeking a replacement for Ouototions from Choirman Mao-a guide-to-life once as ubiquitous in China as Gideons Bibles are here. If so, the new regime should check out a capitalist version of a "Little Red Book," Quototions from Chairmon Morrow, written by George Morrow, the eponymous head of Morrow Computers, His giveaway tome was the talk of the Fall COMDEX, and we at PC Magazine think it's still good reading now. Here are some sample bits of Morrow's micro wisdom:

- · 'Not everybody needs a computer. If a dealer sells one of my computers to the wrong person, my reputation and the dealer's are on the line. Only two groups benefit-the phone company and United Parcel Service."
- . "The user world would be better served if it could run software without hardware." -lomes Lanedell

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PARITY CHECK BY STEPHEN MANES

PC-DOS: Up a Tree and Following the Wrong Path

Great! No clue about what to do next. No sissy on-line help.

No menu either: You can ask for any dish your heart desires. If the chef's never heard of it, you get a "Bad command or file name" raspberry.

That's one tough user interface. And it's the only one you get with the program that, at this very moment, is running on more IBM PCs than any other:

How can this be? There are now enough user-interface studies to fill a 20-MB hard disk. Sure, solid conclusions are scarce: Researchers with fancy degrees still hotly debate overlapping versus tiled windows, multiple- versus single-button mice, text versus icons, color versus monochrome, pull-down versus drop-down menus, and apples versus oranges. The good old A> prompt offers none of the above; it's positively astounding that it's stuck around this long.

Ever since the earliest DOS release, rumormongers have insisted the next version of DOS would include a fancy menudriven "visual shell." Nobody believed the unblinking, uninviting DOS prompt would survive yet another revision. But it's back once again in DOS 3.1, and by now, hardly anybody even bothers to complain. After all, millions of users manage to get along with DOS every day. So maybe this horrendous "command-driven" approach isn't so terrible after all.

No Picnic

Well, yes and no. Learning DOS is no picnic. Dealers still get angry calls from new users who turn on their machines and can't get past the "Enter new date:" prompt because they try, reasonably enough, to ape the display and include the day of the week in their input. What happens when novices try to master subdirectories is too

gruesome to contemplate. Even advanced DOS users are often woefully ignorant of its subtleties. They may understand the difference between COPY and DISKCOPY but have no idea how SYS works. They may know how to change

documented that you can only learn how they work by laborious trial and error. Not once has a DOS upgrade

made things an iota more friendly for most users. Independent programmers have had to develop all sorts of handy utilities in the name of self-preservation. Menu-driven shells let you scroll through the current directory and highlight the file or files you want to work with. Editing programs remember subdirectories but not how to previous DOS commands and



boards and user groups. Many of these programs are fine on their own, but the memory-resident ones can play havoc with the likes of ProKey, Sidekick, and even with each other. Moral: Talk to somebody who's actually used one of these programs before allowing it to scramble every file on your hard

Stuck with the Rudiments

I'm not necessarily against DOS's command-line approach; for one thing, it keeps the overhead low. A menu-driven shell, like the popular Idir, for example, takes another 15K of RAM, and its 30 help screens hog an additional 57K of disk space. You might well be better off with an operating system that's lean and mean and fast and flexible enough to accommodate a menu approach if you prefer it. But by now, DOS itself ought to include a defeatable "official" menu shell and help system. And it could certainly offer a lot more functionality for very little internal overhead

DOS was originally developed in a hurry from a quickand-dirty operating system designed to bring most of 8-bit CP/M into the 16-bit world. Yet many utilities built into CP/M still aren't included with DOS. And after nearly 4 years, it's ridiculous to be stuck with DOS's rudimentary editing functions, inflexible directory displays, and limited utilities. As the current standard in operating systems. DOS should at the very least include the additional functions sharp programmers have managed to develop on their own. Otherwise, today's de facto standard might become

tomorrow's de facto CP/M.

DOS was originally developed from a quick-and-dirty operating system designed to bring 8-bit CP/M into the 16-bit world.

get the PROMPT command to display the current one. They may know how to use CHKDSK but not how to use the /f parameter to make the command actually fix bad clusters instead of just pretend. And handy undocumented tricks like running CHKDSK by typing CHECK or just the letter C (just rename the file CHECK.COM or C.COM) are unknown to all but DOS magicians.

Further Puzzlement

Every time DOS gets updated, it offers more useful tools for programmer types and more confusion for "the rest of us." Just when you've mastered all the arcane virgule (/) options, along come more with the added bonus of subdirectories and backstashes (\) to make your days rich and full. For further nuzzlement, you get a rudimentary programming language for batch files and sundry piping and redirection commands-all useful, all a pain to remember, and all so poorly

let you modify them in a flash. PATH extenders make the PATH command work with nonexecutable files. Directory utilities let you sort directories in just about any conceivable way. But most users don't even know these programs exist, let alone where to find them. IBM, for example, sells such

utilities for \$19.95 a pop through its mail-order-only Personally Developed Software channel. But when DOS itself costs all of \$60, will you really pay \$20 more for some marginal improvement that may not work with all your other software and worse, comes with on-disk documentation that informs you: When calling RETRIEVE to install itself from a batch file, be sure there are no commands that use DOS call hex OA in the batch file following the RE-TRIEVE call"? Me, neither.

The boom in DOS utilities has mostly been in the freebie world of public-domain software available from bulletin Complete with tape drive, controller, and software

Why wait for the IBM® AT internal tape drive at \$1695, when you can have the same thing now for \$QQ

If you read the March 5th issue of PC Week, you know that the external tape subsystem costs even more-\$1995. And if you want 20 megabytes of hard disk with it, be prepared to shell out \$3,495.

ow you won't have to wait for the difficult to find hard-disk version of the IBM AT (model 99). You can buy the floppy disk IBM AT (model 68), add our hard disk and tape drive system for about what you'd pay for the AT hard disk upgrade alone. It's almost like getting the tape drive free.

Let's face it, we've all heard | the horror stories of people who've lost data on their hard disk. True, it doesn't happen often, but then disaster seldom does. With the amount of data you can put on a hard disk these days, no one in business can afford even a small disaster.

When did you last

backup your hard disk? Oh, you did it once with floppies

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BM Compatible tape drive system complete for \$995

The Express Systems drive comes complete-halfhigh tape drive, controller, and software—for only \$995. It's absolutely IBM compatible—all 60 megabytes of it.

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The Express Systems software has additional benefits, like enabling you to use PC D0S terminology such as "*", "*, ", and "?". It also has a built-in reformatter, built-in verification (to make sure you transferred what you thought you did), and it's prompt driven, which means it asks you exactly what you want to do.

Easy to install

doesn't think it's difficult. too They're selling IBM PC ATs with instructions on how to add additional hard disks in the Installation and

Setup manual that

comes with the AT.

And finally, we will sell you Before you get intimidated about installing our tape drive internally, you should under-stand that IBM ape cartridges in boxes of three instead of the usual five. So, you get higher quality with a small

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Our instructions for installing your new Express Systems tape drive follow IBM's clear, simple

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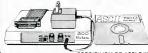
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- · Data transfer facility-beyond "cut and paste"-lets you transfer specific data from one module to another, linking files across all applications. For example: a field in a DBMS record can contain the name of a spreadsheet, a word processing document or selected records from another database. When viewing that record, Enable will automatically display the other "linked" file.
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The XL sells for \$3,295, including cabling, host adaptor, and utility software. You get everything you need.

(Watch out. Some companies charge extra for cabling and

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New Life for the 8088

New coprocessors will add specialized functions like memory management, bank switching, I/O processing, and networking capability to extend the architecture—and the life—of the 8088.

is months ago, the PC AT signed a death warrant for any computer that still used an 8088 chip. Or so thought. Now it seems that the 8088 has gained a new lease on life from none other than Intel. Given the bright prospects for the 80286 in the AT and other machines, continuing the 8088 might look like the height of foolishness. Actually, it's the height of market responsiveness.

The single strongest argument for the continuation of the 8088 is the new crop of memory management cards that take the PC well beyond its 1-megabyte limit. Although Intel's MMU chip is not the only solution, it has been the guiding force for much of the market.

Processor speed is not a real issue either. Over the years, I've had some 8088- and 8086-based systems with hyperthyroid clock rates that will still walk away from a stock PC AT.

The current crop of accelerator cards shows that users are no longer afraid to yank the stock 8088 and stick in a ribbon cable leading to a faster processor. Admittedly, these cards are largely targeted at the existing 3 million PCs currently on the market. But they also give manufacturers an excuse to continue building low-performance PCs.

The New Coprocessors

The emergent subtheme of this market is coprocessing. The new memory management (MMU) chips are really coprocessors. This year is also seeing the greening of the 8087, the original coprocessor. More programs use it if

you have it, and you can buy a card that intercepts 1-2-3's normal math routines and substitutes 8087 calls. All the spreadsheet jocks who bought a PC AT so they could have the answer to their financial models before lunch instead



Bill Machrone

of after could have saved their money.

A board like this runs circles around an AT.

A coprocessor extends the effective excitecture or instruction set of its bost in some way—adding high-precision math or more addersing capability than its designers built in. The basis technique and MMU uses is bank evitching, which alternates among 64K pages of memory cross precision of the properties of the content of the properties of the protain of the protain of the properties of the protain of

memory instead of a mere 64K.

True memory management goes beyond either technique by building memory segments of arbitrary size from a pool of available memory, usually in 4K chunks. This approach has been proven on countless minicomputers and mainframes.

You Haven't Seen Anything Yet

Math and memory coprocessing are swell, but the chip designers have yet to roll out their best stuff. I've mentioned Intel's strides in producing highly integrated networking chips. Only the few that allow a host to hand off tasks to the network board can accurately be called coprocessors. These chips are now small enough and cheap enough to fit every personal computer with a network port. Right now the high cost of networking boards and lack of standards prevent them from becoming highly integrated into the host processor's activities. Higher-scale integration and lower costs will change this picture; so will I/O coprocessing.

I/O Coprocessing

Input/output processing is one of the most tedious things that a computer can do. More CPU cycles have been wasted waiting for something to happen than actually doing useful computing. Basically there are only two ways to do I/O. looping on a port or responding to an interrupt. In the first case, software performs the same loop over and over, waiting for something to happen—a keypenses, a sector from the disak controller.

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Interrupts-the second method-are considerably more sophisticated. You set up a series of actions for the processor to take. It can then forget about them un-

til they actually happen. The external event interrupts whatever the processor is working on. The host jumps to the proper routine to handle the interrupt. then resumes its prior task. The trouble

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PRINTERS . .

is, many of today's programs just sit there, waiting for interrupts, so you're no better off than with looping.

I/O coprocessing has the potential to take the host processor out of the loop entirely. It has worked for mainframes, and so it'll work for personal computers. If you've ever wondered what a mainframe's channel controller was, it's nothing more than an I/O coprocessor. It has its own memory, its own instruction set. and it never gets bored talking to I/O devices. It also can transfer data to and from the host at speeds upwards of a megabyte per second.

While you may not think you need that kind of performance, the difference is only in scale. Instead of hundreds of terminals or dozens of disk drives, the future personal computer will talk to all of the usual external devices and ports through an I/O controller. Your print spooling will be done by dedicated hardware instead of software that encroaches

on your available memory. Chances are good to excellent that many of the functions performed "longhand" by today's communications programs will be handled by the I/O processor. AT&T's new modern card is a harbinger of this future. It has an onboard microprocessor that frees the computer from the details of handling the phone. It can answer the phone, place calls, and otherwise manage the connection. It only interrupts the processor when it's necessary to transfer some data or get more instructions.

What to do next is not a problem that this industry has. The abundant, fertile imagination of the hardware designers is creating a gigantic "in" box for the software architects. There's a host of specialized chips such as database processors and associative memory devices yet to be perfected, string-processing equivalents of the 8087, integrated voice I/O devices, and more.

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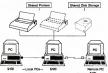
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Letters to PC

Joint Venture Denied

I read Kenneth Friedman's business column with great interest ("Banking on Your Computer," PC, Volume 4 Numterly). He addresses the subject accurately and comprehensively. The article is a very good overview of the near-term future of computer-based banking. I thank you for sparing PC's readers some of the murky banking terminology and for writing directly to the consumer and the small businesperson.

However, I would like to correct one point—the reference to my other plans involving a joint AT&TChemical Bank videotex venture. At no time during my conversation with Friedman did I mention any such venture, although the February 5, 1985, issue of the New York Times did report rumors of related discussions between AT&T, Chemical Bank, and others.

Thanks for a fine overview of electronic banking.

> Charles S. Forbes Chemical Bank New York, New York

Script/PC Compatibility
Dean Hannotte's review of text editors
has some factual errors, and he completely misses the boat as far as Script/
PC is concerned ("Put Your Text in Top

Form, "PC, Volume 4 Number 6).

I was amazed that he panned the program for being compatible with Script V3. As clearly stated in the program documentation, ScriptiPC retains all the ScriptiV3 control words because it is intended to be a subset of ScriptiV3. It fills a specific need for those of us who regularly upload and download ScriptiV3 files. A package modeled on the "senile parent" is essential.

As in ScriptiVS, the despised Scripti
VS control words are in ScriptiPC the
building blocks for GML macro tags and
can be used to create powerful custom
macros. The program includes a file with

definitions of the GML starter set tags along with a description of how to modify them and/or create your own using the DM control word. Script/PC supports conditional processing using IF. THEN, ELSE, AND, OR, and GOTO logical operators together with test parameters, such as EQ or GT. to allow considerable



flexibility in formatting text and a straightforward simple macro language. Some of the items on Hannotte's wishlist for the next generation of formatters for the PC are already supported by the program.

If Hannotte had read the documentation, he would have seen that "see" and "see also" index entries are indeed supported using the :IREF tag in conjunction with the delimiters REFID and SEEID and that multiline highlighted headers and footers are available. The program also offers some other goodies to do multiple columns for indexing, support variables via the .SE or .RV control words, and do multilote column balance for the program and do multilote column balance.

Hannotte's other criticism of Script!

PC is also wrong. The two-pass option for the table of contents is completely op-

sional and can be used at the end of a decument to support one-pass procesure. Decument of the control of the comment of the mater. Not only can the :TOC lag be used anywhere in the document, but a TC control would allows some customization of the table of contents. If Hamonton's benefithmark was remu with the one-pass option, I think ScriptPC and would beat the mater of the others.

I agree that the printer support is limit-

ed, and I loye that future releases will crift bit omission. However, if you know the printer control codes and judiciously use the. If translate command, you can customize ScripiPC for most printers. For example, I can print boxes on my nongraphics Epson and trigger the various color combinations on my color printer by using a simple translate sequence. Characters inserted into the text are translated to the appropriate output printer control codes.

I use Script/PC on my PC and my 3270 PC, and my wishlist includes both printer support and more raw processing speed. I agree with Hannotte's comment that anyone who needs Script/PC compatibility would be foolish not to buy the PC.

D. E. Malone Scarborough, Ontario

ien:

Dean Hannotte replies: I sympathize with Malone's need for strict Script/VS compatibility because it bars him from using the more powerful products now available for the PC. However, he shouldn't expect the rest of us to rally around an inept implementation of obsolete technology.

His happy discovery that the two-pass requirement for TOCs is merely a documentation error will be of no consolation to disgruntled Script/PC purchasers who can't share his knowledge. Even though they've paid \$295 for that great IBM



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LETTERS TO PC

"support," IBM hasn't bothered to notify them of this problem, much less replace the erroneous pages in the manual.

But the TOC goof pales in comparison to the footnote blunder, which requires you to tell ScriptPC how many lines at the bottom of the page to reserve for each footnote. This is something a computer is supposed to do, and the requisite code won't reven amount to 20 lines.

I ddn't mean to imply had ScrightCoden't support 'see' or 'see also' in-dex entries. On the other hand, the documentation does not even mention those terms. It says only that 'The Index Entry Reference [i.e., iREF] say creates or modifies an index entry. It can be used to provide a reference to another including list]. 'If you're already a DCF draidout an human? Since the documentation doesn't give our complete give toujust of the JCF which is the same than the control of the same than the

any never wave to alse instead user who had been also also properly to jury-its printer support into Script C. But his use of, IT removes useful character set and introduces printer dependencies into what should be a high-level source. In fact, some printer attributes—such as underlining—must be turned off at the end of each line and turned on again at the start of the next, and the side printer dependency to the start of the set of the set of the next, and the shalling paragraph formating. When you was a chieve this in Script Ci by diships paragraph formating. When you sets formater to work, it's time to seriously consider a Macinton.

ScriptPC is almost 2 years old. Any reasonable company would have fixed the program by now, but IBM has never even released the enhanced (and debugged) version of its once prominent personal Editor, allowing KEDIT and other products to leave it traiting in the dats. So I wouldn't hold your breath about IBM providing any real printer support in the foreseeable future.

Incidentally, another product Script fans should consider besides Readi-Writer and MicroScript is the recently released WATCOM GML, which supports the Starter Set of DCF Version 2 and includes actual printer support.

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Battery Blues

Tyler C. Folsom's article "Is It Cheaper in Hong Kong," (PC, Volume 4 Number?) contained a common misconception about lithium batteries. Unlike nickel cadmium batteries, the lithium batteries under colcuk/calendar boards are not rechargeable. While it is true that lithium batteries used on colcuk/calendar boards are not rechargeable. While it is true that lithium batteries is not drained while the computer is on, it is not recharged. Therefore, I am puzzled by Polsom's Dreeffore, I am puzzled by Polsom's and the time does it advance: "I su wood and the time does it advance it is not to be advanced and the time does it advanced to the time does it advanced



fective if his lithium battery does not maintain the time for at least a year.

My experience with several clock/calendar boards indicates that your readers will need to replace the lithium battery every 1 to 2 years, depending on how long the computer is left on.

Barry N. Nelson Philadelphia, Pennsylvania

Praise for Holzner

I'd like to tell you how much I enjoy reading PC every 2 weeks and how helpful it is to me, my work, and my enjoyment of the marvels of the IBM PC.

I especially enjoy the programs that are written by Steven Holzner. For those of us who are not professional or even amateur programmers, it is wonderful to be able to construct an occasional utility or device that can enhance the use of the PC. Holzner's programs are ideal for that purpose, and I hope you continue to carry them.

I also must tell you how much I appreciated your boosts for XWPite. As one of the early purchasers, I have become a zealot in proselytuzing others to do likewise. I understand XyWrite III will be out sometime this spring, and I hope you are able to give it an equally favorable review because your imprimatur has helped me persuade skeptics of the virtues of that fine program.

> Lincoln P. Bloomfield Cambridge, Massachusetts

Saving Bookshelf Space

Congratulations on a wonderful, informative magazine. PC has helped educate me and turn me into a consultant. I want to keep all my back issues of PC for future reference but unfortunately I am running out of bookshelf space. Is PC available on microfiche?

Carol G. Sink Silver Spring, Maryland

The editors at PC understand your predicament, and you're in luck. PC is watlable on microfiche from Bell and Howell. Old Mansfield Rd., Wooster, 0H 44691, (800) 321-9881. Microfiche editions are issued quarterly and cost 31) per year for 1983 and 1984 issues of PC and \$29.50 per year for 1985 issues —Fd.

Correction:

The correct price of Tecmar's QIC/60H external 60-megabyte tape drive with controller is \$2,144 (see PC News, "Will IBM Fill Gap?" PC, Volume 4 Number 9).

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Reaching the 32-Megabyte Barrier

The cause of DOS's 32-megabyte disk storage space barrier is hard to pinpoint, but a careful look at the mechanics of disk formatting reveals the source of the problem.

n some ways, the 32-megabyte disk storage barrier resembles the speed of light. It takes a rather sophisticated analysis to show why either one really is a barrier. And, just as many advanced physics concepts are tied to the idea that the speed of light is the maximum attainable velocity, many intriguing side-issues and topics concerning disk storage are related to the 32-megabyte disk barrier. Last issue (see "The Gang of Fourteen: Disk Types for the AT" PC, Volume 4 Number 12) we discussed available disks for the AT and the difference between physical and logical hard disk formatting. This time we'll take a look at the reasons behind the 32-megabyte barrier.

Although the difference is more or less invisible to the eye, the DOS FORMAT command does not work at all the same way on floppy diskettes and fixed hard disks. When we format a diskette, the FORMAT command does what I call physical formatting, establishing the size and number of the sectors that hold disk data. Then the logical formatting, which sets up DOS's road-map for the disk, is done. With a hard disk, it's quite different. The DOS FORMAT command only does logical formatting because the physical formatting is already done-that's another thing that's fixed about a fixed disk.

No Equipment Needed

The physical formatting of a hard disk doesn't require special equipment-it can be done by a program, just as it is for a floppy diskette. (It does require some special commands to physically format a disk, while logical formatting uses ordinary read-write commands.) IBM doesn't put a physical formatting program in everybody's hands, but you can get one. It's part of IBM's Advanced Diagnostics disk, and every authorized PC dealer has it. Many dealers will lend it to you, or you can buy it



as part of the admittedly expensive Advanced Diagnostics package

Normally, we won't ever want to redo the physical formatting of our hard disks, and, in fact, reformatting is potentially very dangerous. Unlike the regular DOS programs FDISK, FORMAT, and DE-BUG, the physical formatting program will wipe away any partitions on the hard disk, besides the normal DOS partitions. However, if your hard disk has been damaged, redoing the physical formatting may restore proper operation.

The physical formatting of a disk establishes the size of the sectors that are on the disk, the number of sectors on each track.

and so forth. The physical formatting also writes onto the disk some information that we never see-special address marks that the disk circuitry uses to identify each sector on the disk. Later, when ordinary read and write operations are done on the disk, the disk's controlling circuitry uses these address marks to help make sure that the right locations on the disk are being used.

While we, and our programs, usually view disks in terms of the files stored on them, our computers' systems software sees disks in terms of sectors. There are two distinct ways of looking at sectors: DOS has one, and the BIOS has another.

The BIOS, as you probably know, is the computer's most intimate set of software. It directly controls the computer's hardware, dealing with the messiest details of the commands that make the hardware work, and coping with any problems, such as hardware failure or simple balkiness. Disks, for example, don't always work on the first try. The BIOS sometimes has to coax and threaten the disk, as if it were a stubborn mule.

Three-Dimensional

As the BIOS sees things, a disk is a three-dimensional collection of sectors. Each sector of data on the disk is located by three numbers denoting the cylinder, head, and record positions. The cylinder (or track) location indicates the sector's concentric circle, from outermost to innermost; the head (or side) location indicates its disk surface; and finally, the record (or sector) number indicates where it falls among the sectors at that cylinder and side location. The terminology for these coordinates can get confusing, particularly since several terms are used interchangeably: cylinder and track, side and head, sector and record. But, no matter which words we use, we're talking about three dimensions that uniquely identify and locate each sector of data.

In last issue's column, we discussed how the size of a disk can be described in four-dimensional terms: the three dimensions that locate each sector, plus the fourth dimension that indicates how big each sector is. We multiply the number of cylinders, heads, and records to get the total number of sectors. Then we multiply that times the number of bytes per sector.

and we get the total size of the disk.

To get a more concrete feel for these dimensions, let's chug through two common
examples. First, consider the PC's lowest
common denominator, the single-sided, 8sector diskette. These diskettes have 4tracks (cylinders) and use only one side, so
multiply 40 times 1 times 8 to get 320 sectors. Each sector is 120 byte, so the disk's
raw capacity is 163,3400 bytes. To translate
that cannotir into kilobytes we can divide

163,840 by 1,024, but there is a simpler way to figure the K capacity. Each 512-

byte sector equals 1/2K; so if we halve the

number of sectors, in this case 320, we get

160, the capacity in K.
Other diskette formats have different
dimensions, but the \$12-byte sector size is
a constant. There are, as we know, singleand double-sided diskettes. Quad-densityle
and double-sided diskettes. Quad-density
diskettes can have 80 tracks intend of 40,
the AT's high-capacity diskettes also have
80 tracks. Finally the number of sectors
per track can be 8 (for DOS 1 x formats), 9,
for DOS 2 x and 3 x formats), or 17 (for

the AT's high-capacity diskettes). Consider the standard hard disk used in the PC-XT. It has 305 cylinders and four sides (both sides of two disk platters); each track circle has 17 sectors, the same number that are squeezed into the AT's highcapacity disk. Those statistics multiply 20,740 sectors, a capacity of 10,370K or about 10 meabutes.

The Layered Look

onerating system.

The dimensional view of the disk taken by the BIOS, which expects to receive the broglinder, head, and record numbers for each disk command, offers a very low-level of perspective. Properly designed computer software is built in layers that reflect increasingly abstract ideas. The BIOS-level view closely matches the physical reality of the disk, but higher layers move away from the concrete to a more abstract view of the disk, such as that taken by the disk

Quite sensibly, DOS does not see the PC MAGAZINE • JUNE 25, 1985

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CIRCLE 112 ON READER SERVICE CARD

storage space on a disk as multidimensional. DOS does not need to "see" a disk's space as multidimensional, but rather as a large pool of space that must be managed easily and efficiently. DOS sees a disk (or hard disk partition) "flattened" into a single dimension: a single linear array of disk sectors that stretches from the first to the last. For identification and reference, the sectors are numbered, starting with zero. A single-sided 8-sector diskette has 320 sectors, numbered 0 through 319. The PC uses a simple algebraic formula that relates the sector numbers that DOS uses to the three-dimensional identifications that the BIOS uses. The software interface be-

DOS does not see the storage space on a disk as multidimensional. It sees a disk "flattened" into a single dimension: a linear array of disk sectors stretching from the first to the last

tween DOS and the BIOS translates a DOS reference to the last sector on a diskette as number 319 into track 39, side 0, sector 8 for the BIOS.

A Nub

This discussion brings us to one of the nutso of the matter. DOS does all of its internal recordkeeping about sectors in sequential sector numbers. The natural way to record these sector numbers is in the form of 16-bit integers, since that is the cassiest and most straightforward way for the PC's 8088 microprocessor to hundle numbers.

The problem is that 16-bit integers on't really have a wide range of values. If we don't need to work with negative numbers (in this case we don't), the 16-bit integer format will allow us to work with secrot numbers from 0 through 65,355—a 64K range of numbers. If DOS can only keep track of 64K of sectors, then it can't cope with any disk that has more sectors than that.

Now 65.536 sectors are a lot-but still.

a limit is a limit. With a limit of 64K sectors of ½K bytes each, DOS can't handle more than 32 megabytes. And that, very simply, is the source of the 32-megabyte barrier in the size of a DOS disk Well, we've found our barrier—the 32megabyte wall. In the next issue we'll look at some more ramifications of the 32megabyte barrier and see some of the ways that we can try to crack it.





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PERSONAL VISION

IBM didn't include everything you might want to make its AT a true dream machine. So, with a little help from third-party vendors, one user configured his own ultimate AT.

PERSONAL

n the 14th of August last year in Dallas, Texas, IBM took the wraps off its PC AT, and the micro market hasn't been the same since. As newspapers and magazines digested the machine's features, they expressed admiration in a fusillade of glowing adjectives-"impressive," "powerful," "dazzling"-declaring their respect for what seemed to be the most advanced PC yet, especially in its awesome speed and power.

Built around Intel's 16-bit 80286 microprocessor, the AT's ability to perform two to three times faster than the PC impressed all who saw it.

But then the list of not-so-special features began to accumulate. Some noted that the keyboard, slightly larger than the PC-XT's, was not as good as it might have been. DOS 3.0, rushed to market before the promised IBM Local Area Network hooks were in place, also proved to have notable defects, some later acknowledged by its author, Microsoft. Backup woes proved twice as woeful as they'd been with the XT. Moreover, several of IBM's older 8-bit add-ons, including its asynchronous communications adapter and parallel printer adapter, didn't work at all in the new 16-bit environment.

The hard disk and floppy drives introduced with the AT were especially disappointing. By early 1985, problems with the 20-megabyte hard disk for the enhanced version would hold up AT production for several months. Even the highdensity 1.2-megabyte floppy drive appeared, in the words of PC executive editor Paul Somerson, to "add a whole new dimension to micro incompatibility."

To complicate matters further, as the fine print in IBM's own publications warned, regular density diskettes formatted on the AT might not be usable in older IBM micros.

Yet through it all there remained one ray of hope: IBM had designed almost every one of the AT's optional features to be user-installable. So, if Big Blue wasn't going to resolve the AT's problems, thirdparty firms could be expected to fill the gap. All the AT user had to do was wait, and

American ingenuity would save the day. And indeed this has come to pass. Today you can have your AT without having to eat it too. Fortified with third-party products, IBM's creation can do far more

than the boys in Boca Raton ever planned. Since the AT's introduction, nimble, independent minds have been working night and day to boost the number of available AT options in six important areas: graphics adapter boards; multifunction and memory expansion cards; data storage devices; floppy disk drives and backup; utility software: and communications, multiuser, and multitasking products. AT add-ons in these categories are examined below. There's no guarantee that your area of interest has been addressed, but rest assured that the products discussed are worth serious consideration.

It is to those with true grit, who have held out for a better AT, that the following pages are dedicated.

Monochrome and **Color Graphics** Adapters

ou look at an AT in the store and like what you see. But as soon as you decide to stop looking and start buying, you're confronted with another double-barreled decision-which display options should you choose? Big Blue offers three for the AT: the IBM monochrome adapter and its associated 12-inch monitor; the IBM Color/Graphics Adapter with a medium-resolution, 16color, 13-inch RGB monitor; and IBM's high-resolution adapter and companion monitor, which is not really a viable configuration since it's incompatible with most existing software.

To color or not to color, that is the question. Even if you work with graphics, you may find it easier and less eye-fatiguing to use a monochrome monitor and settle for seeing actual colors only on the hard copy. Many application packages can display colors as different shades or patterns in monochrome, and monochrome monitors often produce a much clearer image than the more expensive color units.

If you go the color route, you must then decide between a composite video monitor (not among IBM's offerings) and a more expensive RGB monitor. Since the color-red, green, or blue-of each pixel is separately determined in an RGB monitor, its display is significantly better than that of a composite video monitor, which decodes all three colors together, much like a home television does.

The typical RGB monitor is also capable of much higher resolution (the number of pixels that can be expressed horizontally and vertically) than composite video. The higher the resolution of an RGB monitor. the more crisp and accurate the resulting graphics will be-something to consider if you expect to throw a lot of curves (graphically speaking) into your work.

In the final analysis, though, the display capability of any monitor depends on the color/graphics adapter used with it. In particular, the adapter must have sufficient on-board RAM to store the screen being displayed, and the more colors, the more memory needed per pixel. The IBM Color Monitor has a maximum resolution of 640 × 200 pixels, but when used in conjunction with the IBM Color/Graphics Adapter (which has but 16K of graphics memory) it can display only 4 colors at a time, with a resolution of no more than 320 × 200 pixels. Clearly, if you're into graphics, the IBM card is not the way to go.

The Everex Solution

If you don't want to burn any bridges when it comes to the monitor(s) you can use with your AT, you'll need a graphics adapter that's flexible enough to handle all the monitor options. And, if you're looking for optimum flexibility on a single expansion card, consider the Graphics Edge

board from Everex Systems. The technical details on the Graphics Edge board are impressive. The board comes with enough graphics memory (64K) to support either a 16-color display with 640 × 200 resolution, or a 720 × 348 screen in monochrome-an excellent spec for word processing and spreadsheet work. All three kinds of monitors can be attached to it-there are connections for composite video, IBM monochrome, and RGB. Other extras are a Centronics parallel printer port, a light-pen interface, and software utilities including RAMdisk and print spooler. All this can be had for a list price of \$499.

The Graphics Edge board is quick and simple to install. The well-illustrated manual guides you through the DIP switch settings that determine the defaults for the monitors and display configurations. Programming tips and sample BASIC programs that exercise the board's 16-color high-resolution display capability are included, along with the assembly language source code for the screen mode utilities, which are APPROXIMATE AND A COUNTY

Today you can have your AT without having to eat it too. Fortified with third-party products, IBM's creation can do far more than the boys in Boca Raton

ever planned.

provided for you on disk.

Actually, I've saved the best for last. Going beyond the standard IBM 80-column by 25-row display, the Graphics Edge can support what Everex calls "extended display modes." The two formats available (in monochrome only) are 132 columns by 44 rows and 132 columns by 25 rows. This feature, when used with a userconfigurable word processor such as WordStar, makes it possible to view nearly an entire page of a document on screen prior to dumping it to printer. This extended display will prove particularly advantageous for spreadsheet work, and the 1-2-3 driver and patch from Everex produce a very clear spreadsheet display on high-resolution monochrome monitors.

Note finally that the Graphics Edge will run all IBM color/graphics software on IBM's own monochrome monitor. That should be enough to make some AT users opt for Everex forever.

Graphics O&A

How much resolution is enough? IBM's ultra high-resolution boards and monitors certainly look nice, but the ultrahigh bucks that go with them aren't so nice, especially if it turns out that you don't really need super high-resolution color graphics. Tseng Laboratories, a 2-year-old Newtown, Pennsylvania, company may have a practical solution to the problem with its ColorPAK board. ColorPAK is a densely populated long board that mounts in any PC or XT long slot or either of the AT's two 8-bit-bus slots. It is designed to replace the standard IBM color/graphics board and to do a whole lot more if asked. It can enhance the output of IBM's standard personal computer color monitor or it can deliver full high-resolution color graphics when driving a Princeton Graphics SR-12 monitor. When used with the IBM (low-resolution) color monitor. ColorPAK provides flicker-free scrolling, additional colors (8 colors at 320 × 200 resolution compared with IBM's 4 colors) as well as composite video output and support for any IBM-compatible light-pen. When used with the Princeton Graphics SR-12 monitor (available from Princeton





Graphics in Princeton, New Jersey) it can get more information on the screen in text mode (80 columns by 50 rows) and produces color graphics in several flavors:

* 750 a

- 320 × 200, 4 colors
 320 × 200, 16 colors
- 640 × 200, 2 colors
 640 × 200, 4 colors
- 640 × 200, 16 colors

 640 × 400, 4 colors Tseng's board achieves a flickerless 640 × 400 graphics display on the PGS SR-12 by driving it in a noninterlace mode so that each element is scanned on each pass. (Some graphics systems depend on highpersistence phosphors and skip a line on every other scan. This skip technique is less expensive but it produces scroll-flicker.) For \$679 your ColorPAK board includes a small piggyback board called SoftPAK that handles software compatibility between DOS and the Princeton Graphics SR-12 A \$580 version of Color-PAK is available for use with the IBM monitor only, but a Tseng Labs spokesman said that many customers are opting for the \$679 package for use with the IBM monitor. Later, these users need only acquire the SR-12 and move two jumpers to

activate the piggyback board to get highresolution graphics. The ColorPAK board is bundled with Grafix Partner graphics-processing software from Brightbill, Roberts & Co. Grafix Partner enables you to enhance existing software displays interactively. Suppose, for example, you are running Lotus's 1-2-3 with a standard IBM color monitor and the ColorPAK board. If you create a piechart with 1-2-3's standard four colors, you can invoke Grafix Partner from the background to enhance the chart by adding new colors or textures (or even symbols) while still in 1-2-3. The screen then can be photographed, printed, or saved. Grafix Partner will then return to its hiding place in memory, and you can continue processing with 1-2-3.

Installing ColorPAK is simple—the entire process, including opening and closing the box, took me less than 10 minutes.

Tseng Laboratories has a good idea with this product; it is relatively inexpensive, and it can grow as your need for complex graphics grows without consuming additional slots. If ColorPAK has a down-

side, it is only that you're limited to the Princeton Graphics monitor for ultra highresolution—IBM's new high-resolution color monitors will not work with Color-PAK. On the other hand, Princeton Graphies monitors rank with the best and are moderately priced.

The Last Word in Monochrome

One good board deserves another, and Tseng Labs has done it again. This time it has come out with UltraPAK, an AT multifunction board with monochrome graphies capabilities. The Tseng board is long; it uses one of the AT's two 8-bit-bus slots.

UltraPAK uses a single board where the traditional IBM/Hercules configuration requires three to build a system with monochrome graphics, 132 columns, and multiple ports.

UltraPAK replaces the IBM monochrome card and is compatible with all monochrome and graphics software that can run on the Hercules board. Its graphics modes are generally compatible with the IBM color graphics board. In 640 × 200 mode, UltraPAK generates two colors. In the 320 × 200 mode it generates a 4-color gray scale on a green or amber screen.

gray scale on a green or amber screen. UltraPAK slot has three text modes in addition to the normal 80 columns by 23 nows: 132 columns by 44 rows, 132 by 28, and 132 by 25. Software drivers are included to enable Louis s / 2-3 to use the 132 by 44 mode, which increases the viewable portion of a spreadsheet by a factor of three. Tseng said it has identified six other software publishers with systems that can take advantage of the 132-column mode, including several terminal emulamode, including several terminal emula-

While the enhanced AT comes with a single card that provides serial and parallel ports, many AT users are opting to start from scratch. UltraPAK uses a single board where the traditional IBM/Hercules configuration requires three to build a system with monochrome graphics, 132 columns, and multiple ports.

Multifunction Boards

ne of the AT's more noteworthy features is its bounty of expansion slots, a grand total of eight. Well, almost eight, that is. One of them is taken up by the disk controller card that comes with the system, while another is occupied by a video display card. That leaves you with six expansion slots to use in the most economical way nossible.

If you happen to be a devoted patron of Big Blue, you'll want to consider the options available from the same people who brought you the AT. Let's suppose that you either have the enhanced model with a full 512K of RAM installed or were able to locate 18 of the special piggsback 64K chips needed to fill out the AT system motherhoard.

You'll probably want to begin by upgrading your machine to the full 640K that DOS 3.0 addresses directly by adding IBM's 128K memory expansion unit. Then, of course, there's a useful part of the operating system (you can fully exploit it only on the AT) called VDISK.SYS, a virtual disk, or RAMdisk, that provides the equivalent of one or more additional 1.2megabyte drives, which operate at a considerably faster I/O speed. In order to use VDISK.SYS, you'll need two of IBM's 512K memory expansion boards plus a second 128K unit. And then if you want to use other things like a printer and maybe even a mouse, you'll have to buy IBM's special 16-bit serial/parallel adapter, plus a serial adapter cable to offset potential compatibility problems with the AT's DB-9

Have you been adding everything up? The cost for all those IBM expansion boards comes to a staggering list price of \$3,165 (not including tax)—and that's over and above the \$3,995 cost (not including the monitor or display card) of the base model AT. And if you didn't notice.

AST's Answer

There is a better way, one that's more efficient in expansion slot use and potentially more cost effective. AST Research has it, and it is called the Advantage! board. It takes advantage of the AT's potential without the additional IBM overhead, and you can be assured of total compatibility with the IBM product line.

Advantage! sports standard multifunction card features-one serial port (with another optional), a parallel port, and an optional game adapter port-however, what makes it really special is its memory expansion alternatives. As the largest independent manufacturer of peripheral microcomputer products, the Irvine. California-based AST moved quickly after IBM unveiled the AT and became the first third-party firm to provide add-on RAM in user-definable increments of up to 3 megabytes. The company has two boards in one, a main card that holds up to 1.5 megabytes, and an optional piggyback module, the Advantage-Pak, which carries a second bank of up to 1.5 megabytes. But that's not all. As long as they are rated at 150 nanoseconds, you can mix 64K and 256K RAM in blocks of 18 chips each. Three DIP switch blocks allow you to set the board for every conceivable combination of functions and memory allocation.

Moreover, if you opted for a base-model AT, you don't need to order those unusual 64K piggyback chips to fill out the system motherboard. All you have to do is just set the switches correctly and the first 384K on the Advantage! board will be assigned to the operating system. With AST's "split memory addressing" system, all remaining memory on the board is assigned to a second, noncontiguous segment beginning at the 1-megabyte address. And the options don't stop there. Say that you have the motherboard fully populated to 512K, plus another 512K IBM memory expansion board. If you set switches to bring system memory up to the allowable 640K, only 128K on the IBM card could be used. But if you set the switches to access the IBM card above the Advantage!

board's memory, every bit of RAM can be utilized.

untized.
All of this is clearly explained in the Advantage user's manual, which is illustrated with dozens of figures and tables and is easily one of the best efforts at computer documentation I have ever seen. Configuration and installation of the board is clearly explained, along with how to make full yequitated, along with how to make full yequitated, along with how to make full against the control of the AT. And AST has provided all the extra information anyone could possibly want, including such things as parallel printer port and RS-232 printers and addresses, a wiring list for the DB-90 be 25 adapter caleb, and even the AT sys-B-25 adapter caleb.

The 1.5-megabyte Advantage1 board lists for \$3,395, but 128K, \$12K, and 1125K units are also available at \$595, \$1,395, and \$2,595, respectively. The optional game adapter port and second serial port are priced at \$50 each, and the Advantage-Pak booster memory board with no memory installed is another \$150.

One cost-effective way to upgrade the minimum configuration Advantage board would be to purchase all of the chips you will need from a reliable electronics house. One such firm is Microprocessors Unlimited of Beggs, Okiahoma, which frequently refreshes its widely published price lists and guarantees overnight delivery. Using its mid-March prices for 256K.

cbips, install-ityourself RAM can turn out to be a real bargain, at less than \$350 for 1.5 megabytes.

tem memory map.

Though lessexpensive multifunction boards for the AT are bound to appear, I strongly recommend that you stay with AST. Several retail firms report that there are decidedly fewer repairs and returns of the

AST

boards.



Mass Data Storage

we the last few mosths the glittering image of the PC AT has acwould say tarnish—because of problems with the data storage hardware. The core of the problems was to be in the 20-negalate. (CMI) that IBM puts in the enhanced model AT Let's face it, there's ample evidence that the CMI drive striks. I don't jour mean the chance's foot strike, it don't 50% in size, that AT users have encounted the control of the co

are vaculation point inter. for "modelen hard disk death." Because of their declarance hard disk death. Because of their declarance architecture, Winchester-type hard drives have certain inherent limitations. A number of factors, including power failure shock, and even simple whenter, cam proteal loss of all stored data. More offen, a cars will occur when the drive head makes contact with a dust particle or some other contaminant on the disk surface. Even if the hardware is not severely dumined to the desire of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the death of the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the hardware is not severely dumined to the desired of the desired dumined to the desired dumined

this the fact that the AT has over twice the storage capacity of the PC-

XT, so twice as much data is at risk.

Now, out of the West come

the thundering hoofbeats of a small Roy, Utah, firm to save the day. Several years ago IOMEGA Corporation developed a top-rated, 8inch removable 10-megabyte carridge subsystem cattled the Alpha-10. Minicomputer manufacturers were quick to recognize the unit's excellent performance, reliability, and superior cost-per-megabyte a ratio. But, since none of IOMEG Conginal Equipment Manufacturers) were positioned to exploit the descript micro market, the company finally produced its own standalone implementation of the Alpha-10, christening it, for very secol reasons. The Bernoulli Box.

goods reacests, rise sectional took.

In the law of physics that bears his name, Daniel Bernoulli, an eighteenthise century Swiss mathematician, set down control of the properties of the prope

Simply stated, the perfect data storage device must combine the high volume, speed, and stability of a hard drive with the pliancy and resilience of a floppy disk. IO-MEGA's solution was to let the disk spin free, stabilizing it with the negative air pressure generated (according to Bernoulli's Law) by the spinning disk itself. And although the disk comes within 10 microns (roughly 4 millionths of an inch) of the read/write heads, direct contact between the heads and the disk is always prevented, thanks to that cushion of air. Once stabilized, the head-to-disk spacing remains constant. This not only prevents head crashes but results in extremely low media

wear as well. Problems that would spell the death of a Winchester drive produce only "soft" errors on the Alpha-10. The chance for particulate contamination is negligible, since dust and other such contaminants are literally blown away from the recording surface. And, unlike other systems that need to be completely sealed, the IOMEGA cartridge is designed to open once inside the drive. Indeed, the Bernoulli Box has a greater ability to resist shock and vibration than any other fixed or removable storage system now available. Officially IO-MEGA rates its product as able to withstand 3 gravities of shock for 20 milliseconds during disk I/O, but that is probably a very conservative figure.

IOMEGA's package consists of a drive controller card, the Bernoulli Box itself with one or two of the Alpha-10 drives inside, a three-pack of 8-inch cartridges, software, and documentation. A special head-cleaning kit is also available, but you won't need it unless you ordinarily use your AT in a very polluted environment.

Installation of the drive controller card in the AT is easy, thanks to IOMEGA's straightforward documentation. A 37-pin connector on the card edge is attached with a thick cable to the Bernoulli Box, which comes equipped with its own power supply and fan. The sturdy construction of the Box makes it an ideal platform for the AT itself.

The Bernoulli Box software (Version 2.3) consists of a special CONFIG.SYS file, an Alpha-10 device driver, and relations of the control of th

The Bernoulli Box Score

With the proper CONFIG.SYS file, utilities, and device driver (the latter implemented with an AUTOEXEC.BAT life) all in place on a DOS system disk, the Bernoulli-based AT is ready to go—and I mean gol A full lo-megabyte cartridge can be backed up in 4 minutes flat. Even though the tradition speed of an Alpha-10 drives in only half that of a Winchester, the Alpha-10's density of data recording is so great that it achieves the same data transfer rate as a hard disk drive.

All told, IOMEGA's product is a knockout. Extremely quiet in operation, rock-solid reliable, and built like a brick, the Bernoulli Box is an excellent vehicle for either archival, backup, or primary storage of both application programs and data files. With the lowest cost per megabyte of any mass storage system, the Alpha-10 drives also offer the unbestable aid-



vantage of total security. At the end of the day, you can easily remove the cartridge and lock it away—no worries about some teenage hacker gaining access to your data.

Can a great product be made even better? Sure, and it's a good bet that IO-MEGA will do this in two specific areas. First of all, with the right chips on the controller board, Bernoulli Box cutridges can be made self-booting. This feature is already available to PC users but was still in the development stage on the AT as of mid-March. Further down the road is the controller of the still a still

Up the AT

You might not be sold on the idea of a Bernoulli Box—perhaps data security is not a key concern, or perhaps your business uses a database so big that a few files have already grown to more than 10 megabets in size. You can wait for someone to solve the problems of the AT's 20-megabet drives, but you'll still eventually run up against the limitations on both the size and number of internal fixed driven.

If you want mainframe storage capability for your AT, as much as 240 megabytes internal—believe it or not—then Emerald Systems of San Diego, California, has the drives for you. Those of you who've studied the PC-DOS Technical Reference manual may be somewhat skeptical, since



Microsoft and IBM made is clear than LOS all coat to have the most company to the state of the coat to the coat to

The Emerald Systems drive is a breeze to install and use, and rock-steady reliable. The unit we tested was the PS70-3002, which came preformatted from the factory and needed only to be initialized with the IBM's bios and COMMAND.COM rou-

tines. This can be done quickly with the completely menu-driven software provided. Installation of the drive is as easy as hooking up data and drive cables to it and sliding it into the center slot of the AT.

Just to be on the safe side, we ran a complete reinitialization and format. The simplified Emerald installation software replaces the two DOS utilities FDISK (which allocates a portion of the drive for use by DOS) and FORMAT (which initializes the DOS area). Menu options give you the opportunity to update the operating system and BIOS at any point in the future and perform a surface analysis of the drive if there's any doubt about its continued

performance. When the program detects bad tracks, it simply locks them out. All or just part of the disk can be allocated to DOS, and there's an option that allows you to subdivide the drive into as many as 24

One important Emerald advantage is its own cache memory, which allows data to he stored in RAM for the fastest access time possible. Another feature. Emerald's backup/restore utility is designed for use with the company's PS60-2000 internal cartridge backup system (not tested for this article), which is priced at \$1,950. The company claims that the utility lets you perform a full-scale reproduction of an entire volume or do it selectively by directory or individual file, with the option to backup or restore only those files modified after a specific date and time.

With their high data-storage capacity. the products in the Emerald line can greatly enhance the AT's potential for use in LAN fileserver applications. Fast and easy to use, the drives are ideal for companies that don't want to worry about hardware limitations on database growth over the coming years.

Everex Redux

Anyone who has attempted to back up the enhanced AT's 20-megabyte hard

AT Disk I/O Speed

The benchmark that we used permits stopwatch timing of drive speed in completing a two-phase test. A 65,000byte file is written in sequential mode, and then a random access read/write of the same file is performed. Times for sequential access I/O vary depending upon the rotational speed of the drive: random access I/O involves the additional factor of seek time.

Written in C. the test was run with

standard CPU clock speed of 6 MHz and then at an improved 9 MHz speed with a substitute clock crystal installed. Interpretation:

The dual-speed Sbugart 475 drive operating in high capacity mode demonstrated the benefit of the higher of its two rotational speeds (360 rpm) where random access disk I/O is involved. By contrast, the performance of the Kodak TeamMate drive, which bas a fixed 360 rpm speed, was disappointing, particu-

larly when operating at the 9 MHz CPU clock speed.

Despite a rotational speed of only half that of a Winchester drive, the Bernoulli Box performed favorably in comparison with IBM's CMI hard drive. The outstanding performance of the Emerald PS70 in random access I/O appears due in large part to the disk cache software supplied with the drive. But nothing beats DOS 3.0 VDISK (virtual/RAMdisk) for speed.

should Time the seconds)



CPU Speed	Sequential	Random		
-6 MHz	47	221,3		
-9 MHz	26	214.7		
-6 MHz	46	189.3		
-9 MHz	24.7	179.0		
-6 MHz	46	275.0		
-9 MHz	34.5	265.5		
-6 MHz	26.7	52.6		
-9 MHz	16.3	50.2		
-6 MHz	24.4	46.7		
lisk -9 MHz	NT			
	CPU Speed -6 MHz -9 MHz -6 MHz -9 MHz -8 MHz -9 MHz -6 MHz -9 MHz -6 MHz -9 MHz	Speed Sequential 47 47 47 48 47 48 48 48		

10-MB cartridge	-9 MHz	16.3	50.2		
	-6 MHz	24.4	46.7		
20-MB hard o	lisk -9 MHz	NT			
Emerald PS70	-6 MHz	24.2	26.0		
60-MB hard disk	-9 MHZ	15.6	21.4		
OOS 3.0 VDISK	-6 MHz	23.2	11.3		
	-O MILI-	15.9	7.4		

drive onto diskettes—even onto the 1.2megabyte diskettes available for the AT has learned the hard way that there just has to be a better way to archive files. Everex Systems's EXCELL 4500-AT half-height streaming-tape subsystem may give you this better way.

A streaming-tape system, as its name implies, is a tape drive that runs continuously at a relatively high speed while information is dumped to it or read from it.

Mechanically and electronically these tape backup devices are similar to the familiar household cassette recorders. Electromagnetic write heads record information by reorganizing the tape's

IBM and Microsoft make it clear that DOS can't look at more than 32-MB at a time.
But somehow Emerald

Systems found a way to overcome that barrier, producing both 60- and 120-MB drives.

magnetically sensitive surface. Electromagnetic read heads, in turn, sense these "data" spots and report them back.

From the user's viewpoint, speed (data transfer rates) and data integrity (error rates) are the most important factors in a tape system's operation. If the device isn't quick, you might as well stick with floppies. And, if there are errors introduced to the data, who needs a backup?

The Everex system is quick. It takes only 2 minutes and 30 seconds to back up 10 megabytes of data. On the other hand, it takes about an hour to do the same job with floppies.

The system has copy-protected software that enables you to do fast mirror-image backups or slower file-by-file backups. The EXCELL also can back up in the mirror-image mode and then to read back data in the file-by-file mode. With this ontion, it becomes practical to

send large files from location to location

on tape rather than on delicate floppies. Moreover, the two machines at either end don't need to have identically formatted hard disks.

You do file-by-file backup using single filenames or batch commands that enable you to select the data to be backed up by size, date, or last update or to use standard DOS wildcard characters.

In addition, diagnostic tests for the drive controller card and the tape drive are included, and a verification utility for the tapes themselves is supplied.

to EXCEL 4500-AT manages to manages to manages to the SCO bytes per inch onto a 4-inchcam 8,000 types per inch onto a 4-inchcam 8,000 types per inch onto a 4-inchcam 8,000 types per inch onto a 4-inchtipes and 4-inch onto a 4-inchinch onto a 4-inch onto a 4-inch
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Those of you who have used other tape backup systems will also appreciate the EXCELL's cartridge-locking mechanism that prevents damage to the tape and the head. In addition, the system automatically crases the tape before writing.

Trouble in the Cards

A word of warning: Make sure you inspect the controller board before you leave the store. Early versions of the EXCELL 4500-AT (most of the ones on the market) were shipped with a controller board that was designed for the Can ATX. Although this board is electronically identical to the newer slot-independent boards, mounting it in an AT leads to, at best, function to to the Everse board and to the ATS disk controller board. The review system that was sent to PC

The review system that was sent to F-Magazine came with the earlier board. It was an 8-bit card with an apron hanging down beyond the end of the contact strip. This design required using one of the two 8-bit slots on the AT. However, the outer left-hand slot is so far from the drive mounting position that the ribbon cable from the board to the tape drive simply wouldn't reach.

The inner right-hand 8-bit slot is adjacent to the AT's own drive controller. Installing the card here leaves too little room

between slots for the ribbon cable, which must be folded under the AT's controller card, then bent back between the power supply and the drive housings. These multiple folds put considerable strain on both the EXCELL and the AT controller boards.

A newer version of the EXCELL controller board has no extended apron and is slot independent. Therefore, it can be mounted in any open slot—ideally one with an adjacent empty slot to handle the necessary cable folds.

Everex is the first company to offer such a high-capacity tape drive (45 megabytes) in an half-height, internally mounted package. With this size convenience and its speed and back up mode flexibility, the EXCELL 4500-AT could be the answer to the AT back-up blue.

Floppy Drives and Backup

are you now owneed why IBM choice 12 rangelystes as the size for both of 2.7 rangelystes and the size for 67 rangelystes and size for 67 rangelystes for 67 rangelys

While the 1.2-megabyte floppy divises used on the XT can med and write hashed or DoS 2-x, 560K floppies, the disk it sundard DOS 2-x, 560K floppies, the disk it creates or updates are not likely to be readable in standard PC or XT drives because he AT drives write a more narrow track and represent data bits that are smaller than the bits recorded on ordinary media. On a standard AT, then, the only way to write floppy disks that stand a charact of being read on other IDM equipment is with the IDM of th

ble when it comes to disk drive options.



But the AT can't handle more than three physical drives-and that makes a second 360K floppy drive and a second hard disk drive mutually exclusive! Once again, the only way to solve the problem of AT-to-PC compatibility is to find a third party that supplies drives that will outperform the IBM drives.

Fast, and Faster

Last November, Shugart Corporation became the first American firm to produce a dual-speed drive that works well in the AT with the high-density media and creates regular diskettes that are readable in all the other PCs and compatibles.

The flexibility of the Shugart drive is due to its dual-speed read/write channels and brushless dual-speed, direct-drive motor, which ensures that both speeds are constant.

The compatibility gained by using the Shugart 475 drive in the AT does have its price, however. To ensure a smooth rate of data transfer from the AT's own 1.2megabyte drive to a 360K floppy, IBM elected to have both drives always operating at the faster speed of 360 rpm. Consequently, the disk controller card in the AT is not quite smart enough to cope with the speed changes the Shugart 475 drive makes

For example, with two of the dualspeed Shugart drives installed, if you try to run an application program from a regular 360K diskette in drive A: and write data files to a 1.2-megabyte diskette in the B: drive, the system will send its "Abort, Re-

try, Ignore?" message every time any data I/O is attempted to a different drive. You must then wait for the drive light to go off before pressing "R" to continue. Actually, the problem will only arise if you elect to use high-capacity data disks along with copy-protected programs that can't be transferred to a 1.2-megabyte diskette. And most copy-protected application programs on the market these days have been sufficiently error-trapped to recover from such a disk I/O error.

Toward the end of 1984, as the result of a management decision, Shugart Corporation was disposed of by Xerox, which has been its parent company since 1978. And what's become of those Shugart 475 drives? As of February 15 the Japanese conglomerate, Matsushita, took over the entire Shugart mini-floppy line, including the members of Shugart's engineering team. The Shugart drive has since reappeared as the Panasonic JU-475.

How to Stuff a Wild Floory

As an integral part of checking out the operation of third-party drives on the AT, we also tested the high-capacity media available. The old scheme by which the industry rated floppy disks as single- or double-sided and either single-, double-, or quad-density no longer applies for the AT. But until the manufacturers can settle on a rating scale for the new disks, they will be tagged as ejther "High Capacity" (IBM), "High Density" (BASF, Maxell and Memorex), or "Ultra High Resolution" (Dysan).

Of the major brands tested (IBM, BASF, Maxell, Memorex, and Dysan), all disks formatted without error except for one from the Maxell box, which had 15K in bad sectors that could not be recovered. However, the Maxell box contained an explicit lifetime warranty that offers to replace any defective product at no charge.

Teamwork from Data Tech

Data Technology Corp. of Santa Clara, California, has just produced an AT-com patible Kodak 3.3-megabyte floppy disk add-in subsystem, the TeamMate 1103. The package consists of one or even two Kodak drives and a TeamMate disk controller card, which supplements but does not replace the card already in the AT. A major feature of the Data Technology package is its downward compatibility. that is, it can read-but not write toconventional 360K and 1.2-megabyte diskettes. Let's see a hard disk match

However, the TeamMate's technology offers more than just high-capacity data storage. The Kodak 3.3-megabyte drive uses two stepper motors, one to coarse position the read/write heads on a desired track and another to continuously fine position the heads to the track's center line. Using the prerecorded servo data on each high-capacity diskette, the TeamMate's fine-positioning system assures disk interchangeability from drive to drive. And since the same TeamMate hardware can be installed in PCs and XTs as well, the sys-



tem is ideal for high-capacity data exchange. Unfortunately, as the benchmark figures indicate, on the AT this interchangeability advantage takes its toll on the I/O speed, possibly because of the constant coarse- and fine-positioning operations

With the help of Data Technology's well-illustrated user's manual, installation of the TeamMate is a piece of cake. Once the jumpers are properly positioned on the controller card and the drive cable is attached, the unit's card can be inserted into any of the AT expansion slots. The Kodak drive can be installed easily under the AT's 1.2-megabyte drive. The jumper settings on the controller card give you as much (or as little) downward compatibility as you desire: Either 192 (Kodak mode) and 48 tpi; 192, 96, and 48 tpi; or just 192 tpi.

The effect of the TeamMate on the AT's drive designations is extensive. Each mode of operation in the Kodak drive is given a different drive assignment. Thus, with a regular AT 1.2-megabyte system drive, the Kodak drive, and a hard disk, the drive assignments would be as follows: drive A: is the AT's 1.2-megabyte drive; B: is the Kodak read-only mode for standard 360K diskettes (48 tpi); C: is the Kodak read-only mode for standard 1.2-megabyte diskettes (96 tpi); D: is the system hard disk; E: is the Kodak read/write mode for its own high-density diskettes (192 tpi). The AT's software-selectable system switches must be set according to this 5drive configuration.

Alternative Disk Style

The primary advantage of the Teambase is that is offers you a viable floopy-disk alternative to cartridge- or streaming the backup systems. For many users, the 5½-inch floopy is the most confortable, the structed, and familiar means of data storage, and, as well, it takes only eight of the or the ATE 20-megabyte drive. At the current price of \$15 each, the Kodal Kill 600 diskettes are, byte for byte, slightly most but the structure of the the structure of the s

Kodak has taken the high-capacity 51/4inch floppy a big step down the road to mega-memory with these new 3.3-megabyte (unformatted) disks. HD 600 disks are rated at 192 tpi, 17 sectors—that translates into 2.78 megabytes when formatted. The disks even look different. The write-protect notch, for instance, has been moved to the bottom edge—much like that of an 8-inch disk, but in the oposite corner.

You don't have to worry about how to get DOS to format this 2.78-megabyte florov—It can't. In fact, the diskettes are

A major feature of the Data Technology package

is its downward compatibility. It can read—but not write to conventional 360K and 1.2-MB diskettes.

clearly labeled as preformatted. This is because the ultra-fine magnetic servo markings used to accurately position a drive's read/write heads can only be laid down with high-precision equipment.

You do have to use DOS FDISK to initialize a DOS partition on the Kodak floppy, just as you would a hard disk. But, if for any reason you totally crash a diskette, it must be returned to the manufacturer for reformatting.

The Big BAKUP Giveaway

To make TeamMate even more attractive, Data Technology includes a free copy



of BAKUP with each of the Kodak drives. BAKUP is a \$149.95 standalone backup/restore utility that its manufacturer, InfoTools of Cupertino, California, also markets separately.

Most people work on only a few files al day, so their daily backup needs are small. "If you are really conscientious," Steve Roberts, TeamMate's director of retail opeerations explained, "you'll livite down the name of every file you work on each day and where it is, and then at the end of the day, you'll backup each one. Most people just don't have the time or the inclination, so they have two choices backup the entire hard disk daily or not at all."

When used with TeamMate, BAKUP can speed, automate, and manage the archiving process by creating a database of backup information. It catalogs if, where, and when a file was backed up, and on which of several floppies, each with its own volume label, the data is located. This process allows you to do a first-time full backup of your entire hard disk in roughly half an hour and then do daily backups of just updated files in only a few minutes. BAKUP performs all the book-keeping operations needed to manage the process, which can be done with 360K or 1.2-megabyte disks as well as the 2.78-megabyte Kodaks. Should your files be too large to fit on a Kodak diskette, BAKUP will split and rejoin them automatically. The program also provides for multilevel restoration-you can choose which version of a file to restore-the original, intermediate,

or final form. The only problem with BAKUP is that InfoTools has chosen to copy-protect the program. Like most people, I have come to accept the presence of some sort of copy-protection on application programs, but to find it on a utility strikes me as something of a contradiction in terms. Nevertheless, InfoTools has promised that the 3.04 version of BAKUP will include a "de-install" feature that makes it possible to move the program from computer to computer. In addition, it will offer large volume support. With free software like this. Data Technology's TeamMate is a winner.

Manufacturers seem to agree that the market for dual-speed 360K/1.2-megabyte drives will last 2 years at most. They believe by then the entire industry, both hardware and software vendors will have shiftdo over to higher-capacity drives and storage media. Steve Duffy, product manpaer for the Shugart Model 475, said that prior to his company's demise, it had begun work on a 6-megabyte drive, with the goal of getting 10 megabytes on a 51/ainch floppy!

Utilitarian Utilities

Then you use the DOS TREE command, subdirectories and breakneck speed, displaying more blaines than information. What it should do, instead, is display a real schematic of the relationship between all the directories, subdirectories, subdirectories, and so forth on the logged drive.

Recently, IBM has started marketing a program that does that. It is the exclusive distributor for what it calls Personally Developed Software, which consists of programs produced by IBM employees. Of interest to AT users is IBM's Utilities Package, a collection of five separate disk-test, sold individually at an average price of \$19.95, but also available as a package deal for \$55.95, One of the five, Utilities II, includes a program called DOS Tree Display.

The program's TREED.COM file displays a concise, alphabetized, graphiccharacter-defined map of subdirectories on the logged drive. TREED.COM does evcrybing the DOS TREE command should on. It's a simple yet quite useful program that, hopefully, IBM will include with funture versions of DOS. However, be forward. The author failed to error-trap his work fully. If you try to invoke the program from a floppy disk, that has no bage to the screen and cause the computer to hang, forcing you to reboot the system.

The PATH Command Far more sophisticated is

Far more sopnisticated File Facility, another of the disks in IBM's Utilities Package. To understand the usefulness of this program, think a moment about Set Search Directory—de one lig limitation inherent in DOS's PATH command. It finds only executable files, such at those with a COM, EVE, or John Contained. The Path and the Company of the Comp

With File Facility (the authors suggest their program be renamed FF-COM), you have the capability to organize your subdirectories by file type. In other words, your personal letters can be kept in one subdirectory, separate from the word processor you use to create them, while all of

With File Facility, you can organize your files the way

mp .. a ..

you want. Database, spreadsheet, and word processor-created files can all be put in the same subdirectory. your business correspondence is put somewhere else. Using FF.COM, you are abo to organize your files the way you want them. This not only makes the AT easier to use, but it also increases the chances that you'll back up your files on a regular basis. Database, spreadsheet, and word processor-created files can all be put in the same subdirectory.

In addition, if you don't have the BAK-UP program mentioned earlier, you'll be far more likely to perform your security housekeeping chores with only one subdirectory's worth of updated files to copy each day.

As is always the case with a real gem of a utility, however, there are advantages and disadvantages. On the plus side is the fact that FF.COM will not process DE-LETE and RENAME commands. This restriction prevents you from accidentally deleting or renaming a backup copy of a target file that is located elsewhere. On the other hand, some features of the program are quite powerful and must, therefore, be used with extreme caution. For example, FF.COM will not create a new file if the same filename appears anywhere in the current defined path. The existing file is always overwritten. This makes it impossible to format a DOS System diskette. The format function will be performed, but the System files (COMMAND.COM. IBMBIO COM and IBMDOS COM) will not be written on the new diskette-

drive.

File Facility is best used when invoked for a limited purpose from a batch file that will, in effect, disable FF.COM once the function has been completed. This batch file must also be consistent with the way that function is performed. For instance, when updating an existing file, some application programs read a data file and then

just rewritten to the originals on the default

write the updated version to a new file with a different name or extension. When done, the program deletes the old file and changes the new file to the original name. To the user it appears that a simple update has occurred. But using FF.COM is different: Unless you're

is different: Unless you're careful to make the default directory the one that



contains the data file, the old file won't be deleted, and the update will be put some place you didn't intend.

In order to fully exploit the power of File Facility, you must read and digest the detailed instructions that come with the program-and this is no small assignment in itself. Like the rest of the programs in IBM's Personally Developed Software series, all the documentation is on the disk along with a utility for viewing it on the screen or dumping it to the printer. Unfortunately, several fundamental concepts that you need to understand the program's operation are buried like subroutines in various parts of the text, and some important terms are left undefined. In particular, the expressions OPEN and CREATE are used repeatedly, but users who don't have access to the DOS Technical Reference Manual may have some difficulty understanding what these terms are supposed to mean.

However, most of the programs that make up the Utilities Package are excellent. My advice is for you to grab them right away before IBM realizes that one or two might not have passed quality control and temporarily holds up sales of the product. If you don't think that's likely to happen, just try buying an enhanced AT right now.

TDA Templates

The keyboard template places information that won't fit on the screen within your range of vision. For several years now, the BM PC keyboard has been the resting place for templates galore. However, the full-size templates that fit the PC don't fit he AT. IBM seems to have decided that anything called Advanced Technology should be 'ho of an inch longer.

Quick-fix solutions bridge the comparibility gap between the AT and PC keyboards in different ways. DisplayWrid: 3 users can place similar, but non-form-fiting 13½-by 2½-inch plastic rectangles just above the keys, while MicroSoft Word 2.0 comes equipped with a double-sided, postic-down U-based emplace which, because it lacks a bottom code, fits either how the properties of the properties of the lacks and the properties of the properties sory templates, like Systems Management Associates' PC-Doubfalle series, has yet





shown along with entry and edit mode key functions.

What makes the TDA line noticeably different from other such program templates is the presence of a "mini-manual" (size 21/2 by 3 inches) affixed to the right side. Thor Duffin, TDA's president, notes that many of the most popular application packages "can be boiled down to a few hasic subjects. You find yourself doing the same set of tasks over and over again." Thus each of the mini-manuals addresses its own particular set of tasks. The one for 1-2-3 covers eight major topics-entry, editing, formatting, data management, graphing, macros, functions, and printing-in 82 pages. With it you can doublecheck a 1-2-3 command without having to balance the Lotus documentation on your knee while trying to type.

TDA has similar templates available for use with Word Perfect 4.0 and Symphony; versions for DisplayWrite 3, MultiMate, WordStar, and WordStar 2000 will appear shortly. At first glimpse, these templates seem to have one disadvantage: the minimanual is located right over the LEDs that display the status of the AT's CapsLock. NumLock, and ScrollLock keys. Nevertheless, following the example of Lotus's 1-2-3, a growing number of software firms have chosen to indicate on screen whether or not these keys have been depressed. Programs that don't display this information can use UPNUM, a utility readily available free from users groups and PC bulletin boards that displays the status of CapsLock and NumLock in an upper corner of the screen.

Whether you choose to have the AT's LEDs glowing or install the TDA template and mini-manual, you'll end up being ahead either way.

come forward with something that will fit the AT, let alone be interchangeable with the PC.

Enter TDA, Inc., of Herndon, Virginia, with a simple but effective design priced at \$19.95. Each template in the TDA Template Series is molded to fit on top of—not just around—that fittle ridge known as the keyboard "pencil tray" on either the PC or the AT, with an attached open rectangle on the left that is meant to encompass the function keys.

In the case of its 1-2-3 template, TDA puts the 2- by 14-inch flat surface of its product to good use, defining the principal components of all nine "slash" command trees, as well as labeling the 1-2-3 function keys. On the curve over the pencil ridge, arithmetic and logical operators are also

Networking and Communications

The AT has been made the fulcame of IBM's new broadmand local area that sgoing to cost? As a filserver for IBM's 1AN, the AT must be equipped with a translator unit (\$595). Then, each micro connected to it will need a network dapter; (at \$595), coaxial cable (\$29-899), and a special IBM long/short distance kit (another \$39-889). In other words, the cash register's going to fing up at least \$5,000 are to network eight exist-

ing terminals from one AT.

The Software Link, Inc., offers a better (and cheaper) way. Its unique Mulbil and Advanced system doesn't rely on the presence of coutly network interface boards.

Intenda, it uses software and RS-232 con-nections to add multiuser, multitasking other terminals, you can mis sorts, complete, or print-spooling operations concurrently with other programs. And rejector—terminals with the programs and relevance of the programs of the pr

MultiLink Advanced Version 3.0 delivers on its promise of convenience, speed, and fiexibility by partitioning available RAM into as many as nine separate environments. When multitasking, you can switch from one task to another by simply pressing two keys. Each task appears as though it's running on its own sep-

arate computer.

To ensure that each configured partition is given periodic access to the processor, Multil ink's time-sharing utility can periodically interrupt tasks being performed. Another utility allocates variable time slices to different tasks, giving preference to those deemed more important.

MultiLink requires about 16K of overhead, and the background partitions add another 9K each for buffers and other system areas. Regardless of the number of partitions, however, only one copy of DOS is loaded into system memory, so the effective overhead per background partition is very small. Other utilities provided on the MultiLink disk permit shared access to disk files, print spooling, keyboard enhancement, unattended communications (an excellent bulletin board that takes full advantage of the concurrent features of MultiLink), and an interfacing capability

for programmers.

If you go by the book, the IBM AT is capable of supporting no more than two serial RS-232 ports, COMI and COM2. But with The Software Link's special Multi-user Com:Port Board, serial ports COM3 through COM8 can be addressed.

through COMS can be addressed.

To make multi-user operations possible on the AT for on the XTD, Software Link recommends the JAMM Memory Board produced by Tall Tree Systems of Palo Links of the AT for the State of the AT for the AT for the State of the AT for t

The software works smoothly, even in conjunction with programs like 1-2-3. So if you're in the market for a small-scale LAN or want to set up a limited multi-user system using the AT as a fileserver, by all means consider Multi-link.

AT à la Modem

I'd tell you about the direct-connect modem that IBM recommends for use with the AT, but there isn't one. For whatever reason, Big Blue left the market open on that count, and Hayes Microcomputer Products moved in before the AT even touched the ground. Haye's internal Smartcom 1200B and standalone Smartmodern 1200 have been the de facto modern standards for IBM mi-

cros. Today you've got to have some pretty good reasons to buck the Hayes-compatible trend in Pc-XT and AT communications programs. The principal categories compare are price, features, and feet billity. A modern that's better in one and equal to Hayes in the others is worth considering. If you find a unit superior to Hayes in when we have not there categories, you've got winner. Case in point the Informate 212PC internal modern.

The manufacturer of the Infomate 21 2PC, Cermetek Microelectronics of Sunnyvale, California, has been in the electronic components business for 17 years and began marketing its own modems in 1980. Though it is unfamiliar to end users, Cermetek is recognized and respected amore industry insiders.

spectoa among insulary insulares.
The 212PC is a full duplex (Rell 212Aand Bell 103-compatible) 1200/300/110 imodem that has ubu-answer, autodial,
and autoselect tone/rotary dial capabilities.
With a 40-character command bilder.
Though it lacks the speaker found in Haye
modorus, the engineers at Cermetic provide a useful substitute, "call progress
monitoring," which reports when it encounters any one of six different conditions: no answer, rung-back, buys signal,



faulty line, probable voice response, and modern answer tone. And in place of the single self-test feature of the Hayes Smartmodern 1200B, the Informate 212PC sports

eight diagnostic tests.
The 212Fc Juga into one of the AT's
two short (8-bit) slots and a modular telephone cord is supplied for hooking it up to
the phone lines. The manual provides clear
and understandable instructions on every
conceivable variation in operation, though
the absence of page numbers in the index is
a bit perplexing. Also included, on disk, is
a rudimentary data communications program called ModernMane. Unfortunately
this software operates only in 7-bit word,
the software operates only in 7-bit word,
can end and receive files only in ASCII
format.

To test Infomate, I used a copy of Microssit's Crossatik XVII—Cermeta's 11page Application Bulletin No. 102 provided all the extra details I needed to configure the program. The only major changes to the Crossatik (Hayes-compatible) default settings are the dial prefix (DP), dial suffix (DS), and answer prefix (AP) commands. The Infomate modern worked unite well with Crossatik XVI.

The Informate 212PC garners its first Hayes-superior rating in either the features or the flexibility category, however you define them. But what about that two-category advantage 1 implied earlier? With Cermetek the knockout advantage is the price tag—for a limited time the Informate 212PC can be yours for only \$149. Elon 5 years for only \$149. Elon 5 years for the special price is because the

212PC is being discontinued. Cermetck officials say they will still support it but are replacing it with a new model, the 1200 PC, which will be Hayes compatible, have a speaker, and cost \$495.)

The Dangling Conversation

"Dr. Watson, come in here. I want you!" According to tradition, those were the first words uttered over the first tele-

When multitasking with MultiLink, you can switch from one task to another by simply pressing two keys. Each task appears as though it's running on its own separate computer.

phone by Alexander Graham Bell. Ever since, people have insisted on communicating, short or long distance, by voice. The demand for voice communications now extends to the desktop micro. By now most of us have even received as telephone call from a computer. This sort of thing has been going on for several years, but until very recently it cost big bucks and had to be done on a mainframe.

Now, CMC International, a firm

known for its line of Targa hard disks, offers an expansion board that turns the AT into a sophisticated telephone managemen system. Called Pc Diall Log, it digitally records voice dust from the telephone and stores it on floppy or hard disks. With a combination of software and circuitry, and the combination of software and circuitry, constructed as sounds, for retransmission through you telephone receives.

In addition to the software required, the system consists of an expansion card with two telephone jacks (as on an internal new part of the state of the standard phone. PC Dial/Log will transmit your percenoted message to designated numbers. It can record incoming phone message, as well as address individual outgoing messages to those whom you've given mental files so that different outgoing messages can be played to different groups of phone numbers.

Since it gobbles up a huge amount of storage space for each digitized message (incoming or outgoing), PC Dial/Log is not viable for floppy-based systems, even those which use the newer higher-capacity media. With that sole caveat, I strongly recommend the PC Dial/Log system.

The Beat Goes On

There's an important footnote to the suggestions in this article on how you might go about configuring "the ultimate AT." For many who bought into IBM's view of Advanced Technology, the promise of greater speed was the deciding fac-





tor. One market survey showed that over 50 percent of those who purchased an AT in the months following its debut saw the machine's improved processing and disk I/O speed as primary considerations.

When enhanced by the right mass storage device-be it a Bernoulli Box. an Emerald drive, or even IBM's own hard disk (yes, they're shipping again)-the Intel 80206 technology gives a real boost to both sequential and random access I/O. When an AT comes off the assembly line, its CPU clock speed is fixed at 6 MHz. It's possible to replace the 12-MHz crystal on the AT motherboard with an inexpensive substitute and gain a dramatic boost in clock speed to 8 or 9 MHz-possibly even 10 MHz if all your RAM chips are rated at 120 ns. However, the results can be unpre-

> The AT Throttle will give AT users several options for switching the CPU clock speed while the computer is in use.

dictable. And until more users jump aboard the AT bandwagon, most software with timed screen displays will run so fast on the AT that most people won't be able to comfortably read the text.

But, once again, a third-party firm is coming to the rescue. The AT Throttle (patent applied for) will be marketed by Mercury Microcomputer Products, Inc. of Charleston, South Carolina. The company claims that, once installed inside the AT, this little device will give AT users several options for switching the CPU clock speed while the computer is in use.

Those who are still skeptical about the long-term success of Big Blue's micro marvel, take note.

Michael C. Finefrock is professor of history at the College of Charleston in South Carolina. Brian C. Hale is customer support manager at Entre Computer Center in Charleston. Dick Aarons is a contributing editor for PC.

AT Products Roundup

AST Advantage! and Advantage-Pak

AST Research, Inc. 2121 Alton Ave Irvine, CA 92714

(714) 863-1333 List Price: 128K: \$595, 512K: \$1,395,

1125K: \$2,595, 1.5mb: \$3,395; add \$50 each for second serial port or game port. The Advantage-Pak is \$150. CIRCLE 685 ON READER SERVICE CARD

BAKUP InfoTools 10044 S. DeAnza Blvd. Cupertino, CA 95014 (408) 725-1151 List Price: \$149.95

CIRCLE 683 ON READER SERVICE CARD

The Bernoulli Box

IOMEGA Corp. 1821 West 4000 S. Roy, UT 84067 (801) 776-7330 List Price: \$3,695

CIRCLE 684 ON READER SERVICE CARD

ColorPAK and Grafix Partner Tseng Laboratories, Inc. 205 Pheasant Run Newtown Commons

Newtown, PA 18940 (215) 968-0502

List Price: \$580, \$679 with SoftPAK board CIRCLE 686 ON READER SERVICE CARD

Double-Sided High-Density Flexible Disk

Memorex Corp. Media Products Group Santa Clara, CA 95052 (800) 222-1150 List Price: \$7.99 CIRCLE 670 ON READER SERVICE CARD

Dysan HC Disk Dysan

P.O. Box 3418 Sunnyvale, CA 94088-3418 (408) 988-3472

List Price: \$11

CIRCLE 668 ON READER SERVICE CARD EXCELL 4500-AT

Everex Systems, Inc. 47777 Warm Springs Blvd. Freemont, CA 94539 (415) 498-1111

(800) 821-0806 (800) 821-0807 (in Calif.)

List Price: \$1,345 CIRCLE 675 ON READER SERVICE CARD

Graphics Edge Everex Systems, Inc.

47777 Warm Springs Blvd. Freemont, CA 94539 (415) 498-1111 (800) 821-0806

(800) 821-0807 (in Calif.) List Price: \$499

CIRCLE 674 ON READER SERVICE CARD

2HD High-Density Disks BASF Systems Corp. Crosby Dr.

Bedford, MA 01730 (617) 271-4000 (800) 343-4600

List Price: \$8.95 CIRCLE 672 ON READER SERVICE CARD

Infomate 212PC Cermetek Microelectronics, Inc. 1308 Borregas Ave.

Sunnyvale, CA 94088 (800) 862-6271

List Price: \$149 (soon to be discontinued) CIRCLE 679 ON READER SERVICE CARD

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JU-475

Panasonic Industrial Co. 1731 Technology Dr., #650 San Jose, CA 95110 (408) 294-5888 List Price: \$187

CIRCLE 682 ON READER SERVICE CARD

Kodak HD 600 Disk Eastman Kodak Co. 343 State St. Rochester, NY 92121

(716) 724-4640 (716) 724-4380 List Price: \$11.25

CIRCLE 669 ON READER SERVICE CARD MD2-HD Maxell Corporation of America 60 Oxford Dr.

Moonachie, NJ 07074 (201) 641-8600 List Price: \$10.50 CIRCLE 671 ON READER SERVICE CARD

MultiLink Advanced The Software Link, Inc. 8601 Denwoody Pl. S. 336 Atlanta, GA 30338 (404) 998-0700

List Price: \$495 CIRCLE 680 ON READER SERVICE CARD

PC Dial/Log & Concurrent PC Dial/Log CMC International

1720 130th Ave., N.E. Bellevue, WA 98005 (206) 885-1600 List Price: \$495 for PC Dial/Log plus

\$100 for Concurrent version CIRCLE 678 ON READER SERVICE CARD separately)

PS70-3002 Hard Disk

Emerald Systems Corp. 4901 Morena Blvd San Diego, CA 92117

(619) 270-1994 List Price: \$6 150: the P\$140-3002 is \$9,250, and the PS280-3002 is \$15,850

CIRCLE 681 ON READER SERVICE CARD TDA Template Series

TDA Inc. 209 Elden St. Herndon, VA 22070 (703) 437-4148

List Price: \$19.95 CIRCLE 677 ON READER SERVICE CARD

TeamMate 1103 TeamMate Division-Data Technology Com.

2525 Walsh Ave. Santa Clara, CA 95051 (408) 986-9545

List Price: \$945 (note: BAKUP comes bundled with this drive) CIRCLE 673 ON READER SERVICE CARD

UltraPAK Tseng Laboratories, Inc.

205 Pheasant Run Newtown Commons Newtown, PA 18940 (215) 968-0502 List Price: \$680

CIRCLE 687 ON READER SERVICE CARD

Utilities Package IBM Personally Developed Software P.O. Box 3280 Wallingford, CT 06494 (800) IBM-PCSW List Price: \$56.95 (each utility is \$19.95 CIRCLE 676 ON READER SERVICE CARD

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Nonprofit Accounting with

While most accounting systems on the market are aimed at companies that want to build the bottom line. AFI's PC-FUND is designed to deal with the special accounting problems of nonprofit entities.

ot surprisingly, most currently available microcomputer-based accounting software is geared for commercial organizations-those primarily interested in making a profit by selling goods and services in a competitive marketplace. American Fundware, Inc.'s PC-FUND, however, was developed to address the accounting chores of nonprofit entities (hospitals, municipal governments, agencies, schools, libraries, religious groups, and so on)-organizations whose main interests are in carrying out worthwhile social objectives, not building

the bottom line. Nonprofit organizations have different accounting needs than profit-making companies. Simplicity is often important because a nonprofit organization may be small and lack accounting, administrative, and data processing resources. A nonprofit agency manager's key concerns are the collection and stewardship of money to meet the group's expenditures. Agencies often have moral (and legal) obligations to donors or taxpayers that certain funds be used for specific purposes. Because of this restriction, an accounting program must include detailed control and reporting capabilities. Money earmarked for specific purposes are accounted for as separate "funds," hence the common term "fund

accounting." The elements of multiple funds and the related interfund transfers add an element of complexity to fund accounting. PC-FUND is the most complete set of PC-based applications we've seen that meet the needs of the fund-accounting

marketplace. American Fundware (AFI) first developed a comprehensive set of fund accounting applications in COBOL some years ago, using Data General minicomputer hardware. In early 1983, it implemented the key fund-accounting programs in Microsoft COBOL on the IBM PC and compatibles. Figure 1 shows PC-FUND's main menu, which lists most of the applications available from AFI, although some of the government systems are not yet ported to the PC.

Set-up Help

AFI's business philosophy extends beyond merely producing and selling software. It assumes that most customers will need help implementing fund-accounting software. Indeed, the extensive capabilities of this system make it quite a challenge to set up for anyone with limited computer or fund-accounting experience.

PC-FUND needs a substantial hard disk canacity to house the software. The entire set of program files currently consumes

about 7.3 megabytes of disk space. Consequently, most systems have been preinstalled by AFI for its customers-and most customers have used a 20-megabyte hard disk. By using a new version of Microsoft COBOL, AFI hopes to be able to compact the program files to about 5 megabytes, thus making it possible for you to use it on a PC-XT

AFI is willing to help each customer select the microcomputer system best suited for the program's requirements. Customers can then bring their hardware with them to AFI's headquarters in Steamboat Springs, Colorado, for several days of personalized training. There is a \$300 fee for attending the training session.

Of course, you can buy the software directly from AFI and install it yourself. However, because of its many fund-accounting features, we recommend taking advantage of AFI's installation assistance and training sessions in Steamboat Springs-particularly if you're a skier, and the slopes are open for business.

We reviewed systems that were preinstalled on a PC AT, a PC with an external 20-megabyte Tallgrass hard disk, and a PC with an internal 40-megabyte hard disk. As you might expect, the performance is

PC-FUND

American Fundware, Inc. P.O. Box 773028 1355 South Lincoln Avenue Steamboat Springs, CO 80477 (303) 879-5770

List Prices: American Fundware Security System \$695 General Ledger/Report Writer \$1,295

Accounts Receivable/Meter \$995 Billing Accounts Payable \$995 Purchase Order/Encumbrance \$995 Payroll/Personnel \$995 **Budget Forecasting** \$995 \$995 Fixed Assets/Depreciation \$995 Donor Receipts

Requires: 128K RAM, one disk drive and 10-megabyte hard disk, monochrome or color display, 132column printer

CIRCLE 697 ON READER SERVICE CARD Once you've installed the system, you'll

CHAMPAGNE POWDER SKIERS' SOCIETY 02/11/65 (02 CUR) 1.TWF: 00 · · · Hein Heny PRESS (ESC) TO LEAVE TASK FUND ACCOUNTING SYSTEMS: 11 * Assessor Property Records 12 * Treegurer Tex Receipte Report Writer - Purchase Order/Encumbrace - Accounts Peveble 13 . Treceurer Agency 14 . Clerk Reception Book Accounte Receiveble Peyrol1/Personnel 16 - PC-FUND Utilities 17 - Change Division/D 18 - Sign Off PC-FUND Fixed Assets/Depreciation 10 - Denor Receipt ENTER SELECTION DESIRED. 4003

Figure 1: This is the main menu of PC-FUND. It shows all the applications that are currently available as well as some that have not yet been brought down to the PC (those marked *). The security system is accessible through menu item 18.

best on the PC AT. In addition, the AFI development staff has recently ported the apolications over to the XENIX operating system, which gives the system multi-user capability.

The PC-FUND Operations and Installation Guide is required reading before attending the training class or attempting to install the system yourself. It tells you how to set up subdirectories, batch command files, and clearing funds/accounts and how to set your printer for compressed mode. This guide gives an excellent overview of the "first time" procedures for each application and it discusses the parameters that must be defined during implementation of each application.

AFI Security System

PC-FUND has an elaborate user interface, or "shell module," called the American Fundware Security System (AFSS). It supplies the menu structure, monitors user activity, provides password security, prints reports, and maintains accountingperiod tables. The first screen you encounter asks for your user ID and password. If you enter an invalid password more than twice, you are returned to DOS. During the second part of the logon routine, you must enter a valid division and appropriate business date. The business date dictates which accounting period your transactions will be added to during a given work seswant to designate one individual to act as security system manager. ID numbers and one of five security levels can be assigned to each user. The security levels range from complete access, to access restricted by division, to data input or inquiry privileges only. With some assistance from AFI, you can install a special program that will control access to an application within a module. While no security system such as this can be guaranteed absolutely foolproof, this one should be adequate for most circumstances. Each user can select and change his or her own password, so the system manager needn't be concerned with this aspect of security.

Unlike most systems, PC-FUND can monitor transaction activity by tracking user-ID numbers. The program can produce reports that show who's done what and how long it has taken. This tracking can be used to identify inefficient or overloaded operators. Since the system also logs error messages, you can get a list of all the error messages issued, a help in troubleshooting.

The system offers a handy "delayed processing" mode for programs and reports that are particularly time-consuming. You can specify, in advance, a group of routines to be performed during the night. Also, during normal processing, you may direct reports to the printer or to a file for printing later.

The system can store up to 3 years of accounting records for an organization.

Each year is divided into 12 accounting periods, which may or may not correspond to the calendar months. The date tables you establish serve to specify each of the 12 periods in the previous, current, and next years. Year-end close routines "push down" the data by 1 year.

General Ledger

As with most general ledgers, PC-FUND's general ledger module is based on its chart of accounts. Each PC-FUND account number is broken into the following four elements: fund, department, subdepartment, and general ledger account.

This structure allows you to identify the department and the subdepartment associated with each transaction for each account in the fund. PC-FUND's general ledger module lets you prepare informative summaries of your financial records based on any of the four elements in the account number. In developing your financial reports, you can specify an account-code range that identifies logical reporting subgroups. This technique is called "account masking."

Account masks are simply devices that make it easy to specify ranges of account codes. For example, you can call for the summarization of all accounts fitting the "mask" "??20" ("??" are wildcard characters) instead of having to list each of these accounts.

PC-FUND comes with the general ledger listings needed to maintain proper accounting control. These include journalentry listings with batch totals, a general ledger trial balance, a balance sheet, and a revenue-and-expenditures re-

What really separates the general ledger from those of non-fund-accounting systems, however, is its capability to enter "encumbrance" data and to ensure that transactions are balanced within funds. The AFI general ledger allows you to make interfund journal entries. When you set-up the general ledger module, you can indicate if you would want the system to automatically balance the journal transactions between funds. It does so by creating off-setting (fund-balancing) entries to the appropriate interfund accounts when you make an entry affecting two or more funds. Alternatively, you can opt to have | Figure 3: Budget worksheets, generated by the system, make budget compilation easier.

the program require you to balance journal transactions between funds manually prior to posting them to the general ledger. We suggest you ignore the automatic balancing feature-at least until you have the system under control. It may be a convenience for the person entering data, but it could result in a nightmare of a reconciliation at the end of each month.

PC-FUND's fund orientation is apparent in the data that the general ledger main-

tains. For each account, it is possible to maintain actual, encumbrance, and budget data (see Figure 2). Data associated with the prior year, the current year, and the next year can be maintained. Maintaining next year's data is important when developing a budget for the coming year. The program allows you to work on next year's budget, utilizing historical data, while still posting transactions to the current year's

books. Additionally, since AFI realizes no

ILLUSTRATION OF FUNG ACCOUNTING WITH ENCUM

General Ledger accounts 01-03 00-4	110 - Office	Supplies			
	Period I	Period 2	Period 3	Period 12	
Budgeted (Appropriated)	\$125.00	\$200.00	\$300.00	 \$550.00	
Less: Actual amount spent	\$100.00	\$150.00	\$200.00	 \$400.00	
Encumbered (Outstanding PO's)	\$50.00	\$25.00	\$0.00	 \$100.00	
Amount left to epend	(\$25.00)	\$25.00	\$100.00	 \$50.00	

MAR BOTE: 02/13/85 & 04:15 BUS DOTE: 02/15/85				opet Workshoot		FTISCAL YERR	THE PERSON DAY BAPATALE	ME GENTEN E
EL DESCRIPTION		LAST YEAR	THE YEAR	MURLIND PCIAL	PRINCIPLE	tics vs		For
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organization ever closes its books on the last day of the year, you can simultaneously process general ledger transactions for both the current and prior years. You could conceivably keep the prior year's books open for an entire year (Heaven forbid!).

Budget Forecasting

Coupled with the general ledger, AFI's budget forecasting module supports the formal budgeting process typical in most public agencies and other nonprofit entities. This process involves the initial preparation of the budget based on an extrapolation of historical amounts and other factors, a preliminary review by department and program administrators, the review and approval by elected officials, and finally, the budget's adoption and execu-

tion The budgeting module helps you develop your budget for a coming year. With this module, you can generate budget worksheets (see Figure 3) showing lastyear and current-year actual amounts for all general ledger revenue and expenditure accounts: roll the current year's budget into the next year's budget to use as a starting point for developing next year's budget; develop next year's budget by applying fixed amounts and/or percent changes to the rolled-forward last-year budget amounts: print next year's budget in the actual revenue/expenditure financial statement format; and roll the completed budget into the general ledger for use during the coming year. AFI has designed the menu structure to guide you through the process. Should you skip a step in the budgeting process, the system advises you appropriately.

The workhorse report of the budgeting module is the budget worksheet-a "turnaround document." The term turn-around document refers to a report that, after review and pencil revisions, can be used as a source document for revising the budget. You can generate worksheets for all revenue and expenditure accounts or for only certain accounts. You can print worksheets for all funds, specific funds, departments, accounts, or any combination thereof.

Since the budgeting module first helps you in preparing the budgeted amounts for budget amounts to each month. To do this, you must specify, using percentages, how you want the amounts distributed to each month. Here too, the general ledger account-masking feature can be employed to specify individual accounts.

The Report Writer

In addition to using the standard reports, you can produce custom reports with a separate report-writer module, which incorporates this account-masking feature. The reporting module only generates reports from general ledger data, although the other PC-FUND modules allow you to print reports based on user-specified sorting and data-selecting criteria. The report writer appears to be a bit complicated at first. In a few hours, however, you should be able to produce your first report with minimal reference to the manual. (See Figure 4 for an example of a report definition.)

The structure of the report writer is based on six different report types and eight different line types. The report type defines the columns of the report. The line types define the contents of the lines of the report. Several different line types can be used in a report.

The available report types include the report columns common to general ledger reporting such as:

· current-year budget versus prior-year actual:

· prior-year actual versus current-year actual:

· expenditures as a percentage of revenue for current-year actual and currentyear budget;

· expenditures as a percentage of revenue for current-year actual and prior-year

· selected fiscal period; and

· encumbrance, actual, and budget amounts for the current month and the vear-to-date.

The report line types provided by AFI can accumulate the total of specific accounts, accumulate the beginning balance of specific accounts, indicate which line is the percentage baseline for expenditure-torevenue percentage calculations, skip report lines or skip to the top of a new page. initialize various report totals to zero, print the various report totals, print heading or description lines, and print either single or double underscores in the amount col-

With the first three types, you can use the general ledger account-masking feature, allowing you easy reference to ranges of accounts to include in your custom re-

ports. If, when you are defining a report, you forget the codes for the various report and



a year, you must then distribute the annual | Figure 4: A report definition using PC-FUND's report writer report specification "language,"

line types, merely press the Return key, and the list of options appears on your screen. We found this to be a very useful feature—particularly as we developed our initial report.

When you are ready to generate the report, the system writes it to disk to speed your operations. In addition, by writing the file to disk, you can keep a machinereadable copy of the report in the computer if you need to print it again. AFI is working on a program that will allow the report file to be read and converted to the DIF format in order to facilitate exporting the data to popular spreadsheet and database programs.

Encumbrance Accounting

The bill-paying part of the accounting cycle for nonprofit agencies is quite different from commercial accounting. Corporations generally keep track of open purchase orders but make no accounting entry to show them on the books. Public agencies have a greater need to manage cash disbursements since their ability to raise additional tax revenues is limited. Encumbrance accounting is the method used by governmental bodies to ensure that expenditures follow the authorized spending limits. Essentially, the encumbrance-accounting technique involves entering a memorandum in the books when making purchase commitments to indicate that the funds have been reserved to pay for a specific item at some later date. Booking an encumbrance doesn't speed up the actual recognition of an expense-it merely indicates a certain portion of the funds are already spoken for. The expense encumbrance is booked first and then reversed when the actual expense is posted after the entry of a payment voucher into the accounts-payable system. (Anybody want to study governmental accounting?)

Purchase Order/Encumbrance

PC-FUND's optional purchase order and encumbrance module lets you better control this payment process. If you do buy this module, you must also use the accounts payable module. If you simply need to monitor your payables and produce your checks by computer, and if encumbrance accounting is not a concern, the accounts payable module alone will be more than adequate for your needs.

PC-FUND has been designed to write checks from two check clearing funds (accounts payable and payroll) and to deposit all revenues received in an accounts receivable clearing fund. The advantage of this approach is that you can reduce the number of active checking accounts that you have to maintain. The system will automatically generate interfund transfer entries to properly allocate cash-flow items to the funds.

The processing of approved batches of purchase requisitions is the first step in tallying purchase orders. Transactions are entered in batches—with up to 99 entries

The report writer seems a bit complicated at first. In a few hours, however, you should be able to produce your first

to produce your first report with minimal reference to the manual.

in each batch. Each requisition produces a purchase order, which can later be printed on blank stock paper or preprinted forms. The individual line-items on the purchase order can be distributed to the appropriate fund's encumbrance account. Batch totals help you confirm that the sum of the lineitem amounts equals the purchase-requisition total and the distribution total. Purchase-order data can be edited on-screen until the purchase orders are printed, at which point they are posted to the encumbrance journal. After posting, a journalentry adjustment would be required to make any corrections. PC-FUND offers standard reports on

PC-FUND ofters standard reports on purchase-order encumbrances, which include purchase-order history and aging, cash requirements, encumbrance ledgers, and encumbrance summaries by vendor and department.

As in encumbrance accounting, when an invoice for goods or services is received, vouchers must be prepared and approved for entry into the system. Entering the voucher will "reverse" the associated encumbrance entry. The expense distribution will probably involve debits to expense accounts in one or more of the funds, and the credit would be in the accounts payable clearing fund. The system automatically generates the necessary interfund transfer entries. Here again, a full range of reports is available including an aging, a voucher-distribution listing, and a cash-requirements summary.

Once you have reviewed all the vouchres to your saisfaction, the payment process can begin. The cash-requirements report shoeld help you determine the amount should be the property of the property of the ally mark whole ranges of vouchers for payment, however, you can also call for a payment, and the payment of a voucher. After groducing a preliminary accounts payable register and reviewing it for accuracy, checks can be primed in one of two perpoform Data Documents, a national business-forms printer.

Payroll/Personnel

Good payroll/personnel systems must be table- or parameter-driven to allow you to configure the system to your needs. AFI has gone to great lengths to make its system as flexible as possible, giving you an impressive degree of latitude in defining the payroll calculations. The payroll/personnel module allows you to define a very wide range of compensation and deduction types, along with the methods for calculating them. It will even accommodate multiple unions. The AFI system has no predefined payroll periods; thus employees can be paid on whatever schedule is appropriate for your organization. Also, you can have different paycheck cycles for different employees. Employees can be paid on a variety of bases, such as salary, hourly, or a combination of salary and hourly. In addition, you are allowed to enter timecard data on an intrapaycheck cycle. The system allows you to tie each deduction type to an appropriate general ledger account to debit or credit. And, with timecard data, you can specify a nonstandard general ledger account against which to charge an employee's labor.

With this kind of flexibility, it is critical that you properly define the various parameters and tables. You should plan or spending a significant amount of time thinking through all various ramifications

of how you set up the payroll module. AFI is able to assist you in this process. This is one module where such advice is important.

The payroll/personnel module's reporting is solid. Your employee master file and payroll tables can be printed based on dataselection and sort-sequence parameters that you define. Timecard and timesheet edit reports can be produced. Prior to generating paychecks, you can print a disbursements listing to preview the checks. When the paychecks are printed, so are the listings reporting various deductions. You can even specify the order in which the reports are printed. Quarterly earnings and withholding reports are generated as are W-2 forms.

Accounts Receivable/Meter Billing

Nonprofit organizations often have no need for an accounts receivable system. Income is often recorded only when received because there can be no legal claims to donor pledges or membership dues. On the other hand, municipal governments can charge residents for property taxes, water, sewage, and garbage-disposal services. For these reasons, PC-FUND incorporates an accounts receivable module. Included in this module are routines that aid utility-meter billings and compute service charges to rate-payers.

While the definition of a "customer" may vary widely among nonprofit agencies, PC-FUND comes with all the functions required to manage a commercial customer masterfile. The accounts receivable module can run on-line inquiries into customer files, balances, aging, and payment histories, as well as supply an extensive list of standard reports as shown in Figure 5.

The system is able to maintain 99 months of billing history on-line for each customer and use up to 9,999 user-defined charge codes, and any billing cycles, interest rates, and volume discounts you define. Sales-tax tables can be created that reflect local municipality rates. The system provides four programs for printing statements on either preprinted forms or 4- by 6-inch postcards, and these statements can be sorted by ZIP code for bulk mailings. The utility-meter reading capability can generate route sheets with route and se-

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Flaure 5: The accounts receivable module provides a full complement of standard reports. Additional reports can be developed using PC-FUND's data selection and sort sequencing functions. The parameters of these functions are defined by the user.

quence control for the convenience of a utility meter reader. Once meter readings have been entered, a report can be generated based on user-defined deviations from previous readings. This report could be useful in identifying faulty meters, meterreading errors, or other problems. The usage between meter readings is automatically calculated, and any of a number of rate schemes can be applied. The system supplies a complete meter-reading history for rate-payers.

Donor Receipts

The donor receipts module can be useful for an organization that does a lot of fund raising and needs to keep information about its contributors on file. The donor masterfile lets you maintain such descriptive information about the individual donor as basketball fan, music enthusiast. doctor, lawyer, banker, music fund, sports fund, and so on. The donor's contribution history can be maintained in the computer for up to 99 years.

To assist in fund-raising drives, donor history reports can be generated with userdefined data-selection and sorting-sequence criteria. For example, let's say you want to generate a report listing doctors who contributed \$1,000 or more last year, live in a certain region of the country (specific ZIP codes), and you want this information listed in telephone area-code order. No problem-this is the kind of flexibility built into PC-FUND

trail of recorded donations. Numbered receipts can be printed for the contributor's tax records. An address list can be printed for generating mass fund-raising mailings. (This list can be manipulated with Word Perfect.) You are also able to print donor address labels and summarized donor lists with the program.

Fixed Assets/Depreciation

Accounting for a nonprofit organization's fixed assets has been the subject of some controversy. Some organizations expense the entire cost of an asset in the year it was purchased. Others leave fixed assets on the balance sheet at cost, forever. Now, depreciation accounting, much the same as that used by commercial enterprises, is generally accepted by many nonprofit entities.

PC-FUND's fixed assets/depreciation module gives you on-line access to fixedasset cost, location, and purchase information. Depreciation computations and subsequent posting to the general ledger are optional. Depreciation can be computed on a monthly, quarterly, or annual basis, whichever is most suitable.

Five standard reports are included with the package giving you necessary audittrail and transaction listings as well as informative summaries of the fixed assets you have on file.

Other Government Systems

As you will notice in Figure 1, AFI has The program supplies you with an audit developed a number of other government systems for municipalities. Only the Clerk Voter Registration System is currently implemented on the PC. The other applications, which are currently available in Data General minicomputer versions, may be implemented on the PC when mass-storage devices that can properly support such applications are available to the general PC-owning public.

Documentation

AFI's manuals are printed on 81/2- by 11-inch paper and are spiral bound-not the more usual 3-ring hardcover style. The largest volumes are nearly 11/2 inches thick and could be a bit intimidating at first. However, once you get familiar with them, it's relatively easy to find answers to your questions.

Conclusion

PC-FUND is quite a heavyweight system for a microcomputer. It is packed with functions and flexibility-with under-

The donor receipts module can be useful for an organization that does a lot of fund raising and needs to keep information about its contributors on file

standable trade-offs with respect to ease of use and installation. The support, training, and assistance that AFI offers is a major benefit

If you are looking for a system that addresses the special accounting requirements of small, nonprofit organizations, you would certainly be well advised to take a long, hard look at American Fundware's PC-FUND.

-Michael A. Yesko, Christopher W. Buttine, and G. William Dauphinais

Michael Yesko is a manager in Price Waterhouse's Management Consulting Services division in New York. Christopher Buttine is an MCS manager in the firm's San Francisco office, G. William Dauphinais is an MCS partner in Sacramento. California.

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Business Accounting Software Comes of Age?

ver the past year, Price Waterhouse has reviewed over a dozen accounting products, from the sophism of the decident of the simple some for distributors, others for retailers, even not or a manufacturer. Before we begin our second year, we wanted to take suck of what we 've seen and venure to predict where PC-based accounting systems are heading.

systems are heading. First, the market is maturing. The evidence shows that some vendors are now delivering the little and fourth eclitions of delivering the little and fourth eclitions of each product familier a since at all fifteen at sizes. For example, Peachtree pitches is Business Accounting series to business se with relatively comorting series to business se with relatively comorting series to business se with relatively comorting series to business. The series of th

smallest bosinesses. The no fifteen accounting packages. Then to fifteen accounting packages through the provisional prominence through healthy ad budgets, extensive dealer support, and splasby promotion at COMDEX, the twice-yearly personal computer industry show. However, unlike the spreadsheet or database markets, which are dominated by one or two super programs or families of programs, the market firs accounting software is dominated by no single product. Sorm, perhaps domed. In fact, MAI, a vendor of some prominence in the minicomputer market, has already decided to retreat. In November 1 and 1

her 1984, the company handed over the rights to its PC-based software to a group called Promark, Ltd., which will continue to sell and support the products. Further, we understand that Prentice-Hall has stepped back from its original ambitious plan. The big publishing company offers only the general accounting module from its Profit Center set of packages originally announced.

But, the market suffers no shortage of PC-based accounting software. We count over 60 different series of integrated accounting products in our library of accounting systems—and these are just a portion of what's available. New entrants come onto the market each week. Most consist of at least three separate, but infegrated, accounting modules (general ledger, accounts payable, accounts receivable, and others).

Prices Down, Complexity Up

We've been impressed by much of the software we have reviewed. Some of these systems are surprisingly functional. Indeed, several products rival minicomputer software in the range of features and functions they offer.

Such functionality is even more impressive when you consider the bargain-base-ment prices for which it can be purchased. You can buy one of the most fully featured systems we reviewed (EasyBainers Systems from Information Unlimited Software [IUS]; see: "Six Easy Pieces: Accounting Packages from IUS," PC Magazine, Volume 3 Number 8) for as little as \$300 per module. Not impressed?

PC GL., a surprisingly complete, smallbusiness bookkeeping system, is part of the growing body of software available for the asking. That's right—it's free, though the authors do encourage a \$50 contribution. Many systems represent an incredible value, particularly to those of the who are familiar with comparable minicomputer software that selfs for up to \$55.00.

Unfortunately, low-cost functionality does not always come free of problems. Implementing these systems can require a great deal of aggravating effort: organizing accounting records, structuring a chart of accounts, entering "start-up" data. Some users, pleased by the price, don't antici-

pate the cost in time and resources. Fortunately, the systems we've reviewed to date have been relatively bugfree. The major complaint focuses on doumentation, which can be confusing, misleading, or worse, wrong, often because it's out of date. Still, of the accounting packages we've reviewed so far, only one sent our system off to never-neverland, from where we were able to retrieve it with a reincarating Crt-All-Out.

The past year has shown us that accounting systems for the PC are full compromises. A package that tries to cover too broad a market can become pleasly ineffective if it forces you to fight through irrelevant options and feature options and feature But a system can be so simplistic that in doesn't address your real-world accounting needs. Unfortunately, sophistications breads complexity. (Modern greated), when the proting the exception.) You best bet is to invest in ancakee that offers only the



tures your business requires.

Another caution: While there's a good chance that you can find a suitable "financial" application system (for general ledger, accounts payable, accounts receivable, and payroll), the likelihood of finding an appropriate package for "operating" applications (sales order entry, inventory, job costing) is small because these systems are so specialized. Your particular "operating" system probably re-flects your particular industry and your specific management style. For example, in a sales order management application, the odds are slim that your accounting program of choice includes everything you need in pricing flexibility, back-order processing, item substitution capabilities, and so forth. Many companies circumvent this limitation by using one program or set of programs to address their basic accounting needs and building other small "operating" systems for several separate database

and spreadsheet programs.

Probably the biggest single deficiency in the PC-based accounting systems we've reviewed is the absence of effective cash management modules. Day-to-day cash management is important to most small

PC Magazine's accounting experts, like accountants everywhere, could not

repress the instinct to turn in an annual report. There's good news and bad news

(but mostly good news).

businesses. Yet few programs have addressed this need. The Business Pulse Report in the One-Write Plus package (see "One-Write Plus: Variations on an Accounting Classic," PC Magazine, Volume 4 Number 8) is a beginning.

Program designers should also make more creative use of windowing and multitasking. Often, when using a given accounting function, you need access to another separate function or to a DOS command. For example, say you're entering orders, only to find that the customer's name has not been entered in your master file. With most packages, you probably have to exit the function you're in to add the customer to the master file. Wouldn't it be nice to be able to "pop up" a window, access the add-new-customer routine, and close the window without ever leaving the function you were in to begin with? The new EasyPlus from IUS has some promising features of this kind. And certainly TopView (or its "workalikes") should address some of these needs.

Encouraging Trends

We've observed some very interesting and positive trends in the past year's new software. Not just improving, accounting programs are beginning to realistically address the problems associated with single-user software. PCs are personal systems. This is great for spreadsheet work, but it can make life difficult when it comes to handling the accounting chores for a growing business.

A common complaint from those who use PC-based accounting programs is that they do not allow more than one person to gain access to the data files at the same time. While some multiuser and LANbased systems have already emerged, the coming year will see the introduction of more multiuser accounting systems. Probably the greatest number will be offered for use with XENIX on the AT or in connection with IBM's new local area network.

A second common complaint is that accounting systems make it to of difficult to export data to spreadsheets and databases. Some systems allow you to create standard DOS ASCII files containing some of your accounting information. But many allow you to export only a limited set of the data. Even of the packages we've reviewed go far enough in this regard, but we see improvement in the next year.

Another positive trend is the growing number of "vertical" products. Accounting software vendors are now catering to the specialized needs of specific industries. For example, most of the inventory accounting packages for the PC today address only the needs of a typical single-location, wholesale parts distributor. This orientation is natural. There are so many such distributors they make an attractive target market. Soon, however, there will be more inventory accounting packages that meet the more specialized needs of, say, bulk distributors, multilocation distributors, or businesses requiring a complex inventory-item numbering scheme (such as the lumber or clothing industry).

The bottom line is that some real costperformance bargains can be had if you're in the market for a PC-based accounting package. And things are getting better every week. Chances are good that you small business could benefit from one of the available financial packages. Howevre, for these applications unique to your industry, you may have to wait a while or develop the appropriate software yourself. —G. William Dauphinais and Michael A. Yesko

If you have a suggestion or a comment about any package, please drop a line to: G. William Dauphinais Price Waterhouse, Dept. PC 455 Capitol Mall Sacramento, CA 95814

Michael A. Yesko is an MCS Manager for the New York office of Price Waterhouse. G. William Dauphinais is an MCS Partner with the firm's Sacramento office. Both are frequent contributors to PC.

And the Winners Are . . .

The requirements of business accounting software are too varied to award a "Best of Show" prize. But some programs feature elegant solutions to standard problems and deserve special recognition.

Punctionality, flexibility, and friendliness: These are the features we look for when evaluating accounting software. No program does it all, but the packages below are exemplary for one reason or another. Ladies and gentlemen, the Price Waterhouse Hall of Fame.

BOOKS1's Technique of Scrolling to the Correct Account climinates entirely the account code (and vendor and customer codes as well) by allowing you to scroll to the correct account in a window. Better yet, as you begin typing the letters of the account name, the program matchcs, one-by-one, the leading letters of your account titles—until you arrive at the right account, which you can then select by hittine Enter.

BOOKS!'s Predefined Charts of Accounts consists of ten different charts for each of ten types of businesses, making it

much easier to get started. BOOKS!'s Transaction Annotation Facility allows you to affix a 72-character, free-form note to each transaction. This helps restore one of the things people miss most after shifting from a manual to an automated system: the ability to annotate transactions freely. Computer systems seldom allow you to "jot down" notes or comments that may help you understand later what you recorded. For example, say you receive \$20 back from an employee after a business trip and are not quite sure how to record the transaction. Using a manual system, you would have no problem scrawling a note in the records to the bookkeeper, clarifying what had occurred. Not so with most automated systems. So hail this thoughtful touch from BOOKS!. (See "Electrify Your Ledger with BOOKS!" PC Magazine, Volume 3 Number 9)

Rags-to-Riches's Single-Characte Account Coding Scheme wins the prize for simplicity and function in the Very Small Business category. It's tough to top Rags's use of a single character to top Rags's use of a single character to code when entering transactions, you can literally let your fingers do the walking—across the keyboard—aunit you find the across the keyboard—aunit you find the country of the proper second to the control of the proper second to the proper se

Visual Presentation of One-Write Plus, another "low-end" accounting package, did the best job of employing package, did the best job of employing visually pleasing and useful screen formats. For example, the screen used to capture cash-disbursement information appears exactly like the check and check such that you would otherwise be white the plant of the plant in a manual system. Now that's friendly, (See "One-Write Plus: Variations on an Accounting Classic," PC Magazine, Volume 4 Number ? J C Magazine.

The Powerful Report Writers from IUS and Solomon III are good tools if you want to custom-design your financial reports. For a report on Solomon III, see "Getting Wise with Solomon" (PC Magazine, Volume 4 Number 2).

PC-FUND's Extensive Budgeting Facilities, starting with the production of budget worksheets, was best in helping create and maintain a budget for your operations. (See "Nonprofit Accounting with PC-FUND", page 138 in this issue.)

IUS Transaction Audit Trail Listings did the best job of creating a clear audit trail between the subsidiary systems and the general ledger. Transaction listings produced by the subsidiary systems include a clear reporting of the financial amounts flowing into the general ledger, as a "trailer" at the end of the report. (See "Six Easy Pieces: Accounting Packages from IUS," PC Magazine, Volume 3 Number 8.)

MAUBasic Four's Automatic Allocation Function provides real help in extablishing and processing "standard" monthly allocating boths in "from", count and not or more "to" accounts. The system will then automatically clear caren the "from" accounts, Objective the amount in it to the "to" accounts (based upon percentages you establish). "Sizing Up the Basic Four," PC Magariae, Volume 3 Number 21).

Dow Jones's Account Summarization and Reporting Structure lacks a report writer but has a very useful facility to create an account hierarchy that dictates how your detail accounts are summarized and reported. An example:

0705 Talephone Expense 0705 . 1 Telephone Expense

(Merketing Dept.)
0705.11 Basic Charge
0705.12 Long Distance - AT&T
0705.13 Long Distance
GTE/Sprint

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The Dow Jones Report and Screen Clarity of Design was the best we observed. They effectively employ the indented account structure described above, which results in clean, understandable screen formats and easy-to-follow reports. (See "Dow Jones Does the Books," "PC Magazine, Volume 4 Number 6.)—G. William Dauphinais and Michael A. Yesko.

DATA BASE	LANGUAGES
MANAGEMENT SYSTEMS	Lifeboat Lattice C Compilar Ce
Fox and Geller Quickcode	Run C Interpreter
Fox and Geller QuickReport \$140	Microsoft C Compilar \$23
Knowladgeman \$225	Microsoft Pascal Compilar \$17
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RIDAY \$159	Norton Utilities
PFS Fite \$78	Copy II PC
Nutshall \$55 RBasa 4000 \$240	Prokey V3.0
RBasa 4000\$240	Prokey V3.0 \$6 Total Harvard Project Menager \$25
CLOUT 2 \$129 Powar Base New Varsion	Microsoft Flight Simulator \$3
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Vord Takes Another Forward Stride

Microsoft Word has always been a frontrunner in supporting innovative hardware. The new Word 2.0 continues this tradition. and it is also easy to learn and grow into.

quiet revolution is occurring in word processing technology that will have a significant effect in offices over the next few vears. New developments that improve output quality and increase efficiency will make software that lags behind obsolete. One such development is the laser printer, which offers fast, quiet printing that comes close to matching the high quality of typeset copy. Although laser printers have been around for several years, their price has recently dropped from over \$10,000 to under \$4,000. Another development is the more widespread use of the mouse as a keyboard adjunct. A mouse can speed editing by reducing the keystrokes needed to execute menu commands. It can also reduce learning time for new users. In the past, many have resisted mouse technology because to use it their hands must leave the keyboard. The mouse, however, is an increasingly popular alternative.

Microsoft Word was one of the first packages to take full advantage of both laser printing and mouse technologies. It was ahead of its time when first released in November 1983, and many users found it a bit intimidating. With its release of Word Version 2.0. Microsoft has taken a further



step in the right direction. While the program still has room for improvement, its excellent instruction disk, new documentation, expanded Spell dictionary, and support for the newest and most advanced hardware make this latest release of Word a more appealing product for a wider base of users.

Learning Word

When Word was first released, many critics complained that it was difficult to

grasp and that its documentation was inadequate. Microsoft has given the manual a complete facelift for Version 2.0, starting with a change in the color of its packaging from somber dark green to a more pleasant red and gray. The manual includes a twosided plastic keyboard template that shows commands for both keyboard and mouse. This brand-new manual, with its colorful illustrations, is much more accessible. It includes both a supplement to the previously released, on-disk tutorial and an indepth reference section on commands and features.

First released in October of 1984, the Learning Word disk tutorial is one of the best we've seen. It employs instructional methods users respond well to, according to product analyses. The tutorial also makes good use of graphics to heighten and maintain user interest (See Figure 1). The tutorial takes about 3 to 4 hours to complete.

Each learning module begins with an outline of the subject matter, then a demonstration of the feature or command, followed by practice and review. You can follow lessons in order or jump around as you wish. When we sat a complete novice at the keyboard with Learning Word, he was making simple edits in less than an hour.

Better Spelling

Another feature that has been enhanced in Version 2.0 is Microsoft's spelling checker, Spell, which was first introduced with Word 1.5 in October 1984. Spell has always been an excellent program, but this new release includes two major advances. The standard dictionary now contains over 80,000 words, and Spell now runs directly from the Word menu.

The original Spell used a dictionary licensed from Oasis Systems, the developer of Word Plus, but the new version's dictionary was created especially for Microsoft. It includes many more prefixes, suffixes, derived words, and proper names such as states, cities, countries, and companies, according to a Microsoft spokesman.

When you choose the Spell option from the Word menu, the program then prompts you to insert the Spell disk. Spell first saves the file you've been working on,



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Figure 1: The Learning Word on-screen tutorial is an excellent introduction to the program and can help you get up to full speed.



Flaure 2: Microsoft Snell displays the text in which a spelling error occurs and suggests the correct spelling as well.



Figures 3 and 4: Word's menus and text windows look sharp when displayed on an IBM Enhanced Color Display with an IBM Enhanced Graphics Adapter Card.



then reads the file, and then reads the dictionary to check the spelling. When this process is completed, Spell reports back to you how many words were checked and how many "unknown" words it found. For each "unknown" word, Spell shows you the spelling as it occured in your document and the text of the line in which the word occurs (see Figure 2). You can correct the word either by typing in the correct spelling or by using the arrow keys to choose from a list showing the correct spelling of the word or similar words. You can also choose to ignore the word and go on to the next one or to add the word to either the program's standard dictionary or your own dictionary.

Spell has five additional programs that can be run either directly from within Word or invoked from DOS. The Lookup program will check for the correct spelling

The Learning Word tutorial is one of the best we've seen. When we sat a complete novice at the keyboard, he was making simple edits in less than an hour.

of one specific word, saving the time inowled in looking through the entire dictionary. Word Count counts the number of words in a document. Word Frequence counts the number of times each word is used in a document and lists the total number of words and the number of unique words. A separate file lists how many times each word is used.

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What products? Word 2.0 supports the IBM Enhanced Graphics Adapter Card, the IBM Enhanced Color Display monitor, the high-resolution Hercules Graphics card, and the Intel 80286 processor used in the IBM PC AT. Word's formats, includ-

It has long been true in the PC industry that software support trails innovative hardware. Not so with Microsoft. While other developers will eventually catch up. Word supports these

products now.

ing its small capitals, double underlining, and super- and subscripts, look outstanding on high-resolution graphics hardware (See Figures 3 and 4). Documents may be viewed on-screen almost exactly as they will appear when printed out.

Word 2.0's support of new printer technology, especially laser technology, is actionality. The new version supports IBM's thermal transfer printer, the Quietwirer, as well as the higher-priced Xerox 2700 laser printer. Documents printed out on a Hewlet-Packard Laserlet using Word are of very high quality; Word's special character formats look wonderful when output on the Laserlet (See Figure 3).

Word 2.0 also supports Apple Computer's new LaserWriter printer. The LaserWriter connects to the PC's serial port, and when you install the appropriate driver with Word's easy-to-use Setup program, a DS disk.

Example 2

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Printed on the Hewlett-Packard LaserJet Printer using Microsoft Word.

Figure 5: Word fully supports the Hewlett-Packard Laser-Jet printer. This sample uses the proportional spacing font cartridge.

PC can drive this powerful printer. The LaserWriter produces true Times Roman and Helvetica fonts, as well as supporting Macintosh graphics (See Figure 6).

Make New Friends

In addition to these major improvements, Version 2.0 has added a few other goodles. For example, in the new version you can run DOS commands such as CHKDSK and FORMAT without exiting Word, a tremendous convenience. Who you select the Library Run command, Word prompts you for the DOS command and allows you to insert the appropriate Another new feature is a hyphenation program, which boasts up to 38,9% accuracy in deciding where a word should be hyphenated. You can let the program do all the hyphenation for you, or you can lot the program do all the hyphenation for you, or you can choose to confirm each hyphenation decision. We justified this article after it was written and let Word hyphenate the text for us. The results were good; the program made only one expression.

Word 2.0 allows you to use the entire screen for editing. You can turn off the command lines at the bottom of the screen by using the Option Menu command. Word 2.0 also lets you confirm its automatic placement of pase breaks. You can



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This paragraph demonstrates the courier font. It is a fixed pitch font. This is bold courier. This is itslic courier. This is 10 point courier. This is 12 point courier (with bold).

This paragraph demonstrates the Times Roman font in 12 point size. It is a proportional spaced font. This test is 10 point. This 10 point Times Roman would be ideal for multiple column printing, such as a newletter. This is the same fort and size in bold. This is the same fort and size in bold. This is the same fort and size in bold. This is the same fort and size in bold. This is the same fort in a 12 point size and italic. To less Times Roman font is 1 point, it is very small and can be used for footness and fine print.

The Helvetica font is useful for headings and titles. The top line on this page is 24 point. The second line is 18 point and this paragraph is 12 point. This is bold helvetica. This is table helvetica.

Figure 8: Word is the first PC-based word processor to support Apple Computer's LaserWrite printer.

use the arrow keys to change the location of a break to shorter pages.

But Keen the Old

These many improvements have not changed Word's basic operation and approach to word processing, which has always been mitigue. Besides the standard feeders are produced from the great and an advantage of packaged from the great as a multi-intergr facility, the program retains its use of multiple windows, full mouse support, the useful "undo" command, macro-like facilities, and a wide variety of from the support of these familiar features have no been changed in changed for the program of these familiar features have no been changed in changed as when been changed in the program of the program of the production of the production of the program of the program of the production of the production of the program of the production of the program of the production of the production

One aspect that has not been improved in Word 2.0 is its speed in loading and in saving files. Although the rest of the program's operation is speedy enough, these operations seem to take an excessively long time, especially on a two-floppy disk drive system.

Word still offers some of the most powerful windowing features of any word processing product for the PC. You can open up to eight windows on the screen at once; each window can contain a different file (see Figure 7.) Of course, two open windows is usually enough for most purposes. The ability to move or copy blocks of text from one file to another on-screen is ex-

tremely convenient.

ture easier to use.

However, in the the new Word version, both headers and footers must still be entered as part of the text and then marked appropriately—a separate window for headers and footers would make this fea-

The original release of Word was ahead of its time in its inclusion of two powerful macro facilities. The first, "style sheets," enables you to assign even a complex format to any Alt-character key combination, then use that combination to formst selected text. Each style sheet acts as a kind of print filter or termplate that can be accessed with a few keystrokes and applied to different blocks of text.

In Word 2.0, Microsoft has added five prepared style sheets—two for letters, two for outlines, and one for a mem—adapted from its recent book of style sheets, Word Processing with Style by Peter Rinearson, soon to be published by Microsoft Press. The second macro facility, "glossa-

ries," has not been changed. "Glossaries" lets you select any section of text and assign a name to it. If you forget the glossary name later, Word will show a list of names to choose from. While the glossary is a handy feature, it is not as useful as some of the keyboard macro programs on the market; it requires more keystrokes and cannot include commands. A Word glossary requires a minimum of four keystrokes to ProKey's two, for example.
And you can't include print and save commands in a glossary the way you can in a ProKey macro. (On the other hand, Pro-Key won't let you easily view a list of your macros from within most programs.) Perhaps Microsoft will correct the glossary's deficiencies in the next Word mlease.

can be of the original Worfs most advanced and admirable features was its complete support of a mouse. Word 2.0% mouse interface has not changed, and it is still a perfectly acceptable implementation. However, the program's mouse response no longer impresses us as much as it once did. In comparison with the Macintosh's mouse interface, it seems a bit mustry and imprecise—the curvor does not

Word offers some of the most powerful windowing features of any word

teatures of any word processing product for the PC. You can open up to eight windows on the screen at once, and each window can contain a

different file.

track mouse movements as exactly as it might, and it leaves a sort of ghostly trail

on the screen at times. The difference is hard to pin down—it's not so much a matter of speed, but of handling, rather like the difference between steering a BMW and a Chevrolet.

For the Future

For the ruture
On the whole. Word 2.0 is a high
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The control of the control of the control of the
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easy to learn and grow into. More than
that, the new version's terrific hardware
support demonstrates Microsoft's commitment to the word processing revolution
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Flaure 7: A Word display showing multiple windows.

Park officials track grizzlles with automated system

he park uses its Distipoint Corp. 8500 mil-ular and 5 sothware program developed in-ho-sther information on the behavior of the pa-y bears. Known as the Bear Tracking Program, recently, the Wildlife Tracking Program, in a stower park officials to check on bear behave me and provide area rangers with information sightings and related incidents.

This yeer, an increase in the number of is humans has kept park officials buty meating the humans that have been a second of footer, park technicate. There have be not been applied figuries this yeer. In Juliciad and littled 9 25—year-old Swedingsdring in the sufficience. A few weeks the rold boy was attacked while steeping in nutsello park compround.

camera-ready type.

personal computers running Word to Allied Linotope's Linotronic 101 laser typesetter, a low-end machine that produces characters with a 1,440 lines-per-inch resolution. With the new interface, typesetting can be done at the word processing level, eliminating the need to insert elaborate codes (see Figure 8).

"Every park had different needs," he added on was designed to help <u>exceptody</u>, and helping every body was asking too much of a computer program." Figure 8: Used as a front end for Allied Linotype's Linotronic 101 typesetter, Word produces

al parks in 1978 according to Jo risory biologist at the National Park nation, D.C.

Microsoft Word: EXMIZ.DOC

It's high time other software developers joined the revolution instead of hanging back on the sidelines with less-than-stateof-the-art programs. Word may not be word perfect, but it's in the vanguard.

Diane Burns and S. Venit are frequent contributors to PC Magazine.

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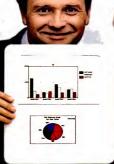
PRINTOUTS TH

Take a close look at Canon's line of printers. The first thing you'll notice is how good they make you look. That's because Canon's experience in high-tech optics really shows. For instance, Canon was among the first to make a desktop Laser Beam Pinter. At a price that's within any business's reach, the Canon Laser Printer can produce eight pages a minute with a quality that's more in common with a professional print shop than a personal computer.

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Mainframe Financial Modeling Comes to the

IFPS/Personal goes far beyond the capabilities of most spreadsheet products with its sophisticated features ported from the popular mainframe version.

Micro

xecucom's IFPS/Personal is a sophisticated financial modeling system that may find admirers among two very different groups: financial planners who currently use the mainframe version, Interactive Financial Planning System, and those now struggling along with a microcomputer spreadsheet program.

If you use the popular mainframer persum, you may be looking for a way to integrate micros into your decision support system, enabling planners to enjoy a PC's advantages while retaining the ability to share information and coordinate results. IPSPPersonal can be this link. It allows you to extract information from a mainframer numning IPFS, work with to on the PC, and then return therein a state of the property while almost the property while almost the property of the property of the property while almost the property of the property

If you're a spreadshert user, on the other hand, you may be finding spreadsherts inselquate for the kind of sophisticated planning and modeling you'd like to do. For goal seeking or creating models that require simulatneous equations, spreadsheets can be frustraing, if not totally inadequate to the task. And you can't easily use them to save bear models or to share and maintain models, because they don't describe business problems in readily understandable terms. IPPSIPers and may be the sophisticated variance. system you need. It will enable you to do such calculations as accelerated cost recovery, depreciation, goal seeking, internal rate of return, loan amortization, netpresent value, loss carry-forward, and simultaneous equations. And it lets you consolidate multiple worksheets.

You can direct the program to manipulate a matrix of data, perform interview "what if" analyses, and create reports and argulate from the results using either commands or a hierarchy of menus. For quick debugging and case analysis, a split screen displays both the model result and the logic framework of the program of the program of the screen of the program of the screen of the program of the screen of the program constructs the model from all available information.

From Mainframe to Micro

Execucom originally envisioned IFPS/Personal as an extension of its mainframe product and, for the first release in November 1983, made it available to IFPS users at a price of \$3,500 per copy or \$20,000 for ten. In January 1984, the company began volume shipments, dropping the price to \$3,000 per copy. In response to demand from non-IFPS users, Execucom has now shifted its marketing strategy to embrace those looking for a standalone microcomputer product. It has halved the price-to \$1,500, or as little as \$475 with volume discounts-and put out a \$20 demo disk whose price is applicable to the product's purchase.

IFPS/Personal comes equipped with a communications feature that allows you to upload and download your model to and from the mainframe version of IFPS. The up- and downloading process does require

20 min mile

IFPS/Personal
Execucom Systems Corporation
3410 Far West Blvd.
Austin. TX 70731

(800) 531-5038 (512) 346-4980 List Price: \$1.500

List Price: \$1,500 Requires: 512K RAM, DOS 2.1 or

later, hard disk recommended. CIRCLE 666 ON READER SERVICE CARD



Figure 1: As you create the model's logic, the program converts it to a spreadsheet format that appears above in a separate window.



VIEW MODE

Gal: EUDHES = 15000, FREVIOUS * 1.85
Rd.just: FRICE
Figure 2: In this split screen, the program is set up for goal seeking.

translation, since the commands for both products are not completely the same, but the execution time is relatively short. The mainframe IFPS has a number of utilities that allow you to work with various general ledger, database, and statistical packages.

IFPS/Personal is not difficult for spreadsheet users to learn because at its core is a spreadsheet representation of data. However, you first enter the model's logic in the program's English-like language, and the program converts this

Model FINANCE, NOT

logic, as you create it, to a spreadsheet format that appears in a window above. You can then use the spreadsheet for doing case analysis.

As you can see in Figure 1, the language in which you enter model assumptions and formulas is fairly simple, as in Revenues = Price * Units Sold or Cash Collections = 60% * Revenues. (The as-

terisk indicates multiplication.)
When creating and modifying the model logic, you use IFPS/Personal's fullscreen editor, which offers such traditional
commands as add, change, delete, and replace. The program automatically numbers each line for you, almost all the commands can reference the line numbers. A
'logging' function records your keystrokes and creates an execution, or EXEC
lile. The EXEC file is rather like a macro

or batch file that records your commands for later use. You can then use this EXEC logic file to automate such repetitive processes as consolidating files and testing alternatives by rerunning the model.

Once you have a logic file, IFPS/Personal calculates the model and generates a spreadsheet work area in which you do most of your design and analysis. You enter your data into the spreadsheet's rows and columns, perform calculations, design additional logic and evaluate alternatives. IFPS/Personal allows you to build a set of case criteria, calculate and overlay the results in the work area, and then, if you like, save the case criteria in a file separate from the logic. This last capability, to separate the data from the rules, is a crucial difference between IFPS/Personal and a spreadsheet; it means you can process many different sets of data with the same model or the same data through many models.

Analytical Capabilities

IFSPSPersonal offers you almost the same analytical functions available with the mainframe version. It lets you take such common calculations as intend of return, net present value, depreciation, you can with a spreadsheet. For example, you can specify any one of a number of prepared to the present value, which we have the pretain of the present value of the prepared to the pretain of the prepared to the pretain of the pretain of the pretain of the pretain of the prepared to the prepared to the pretain of the prepared to the pretain the prepared to the pretain the p

IFPS vs. ENCORE!

How does IFPS/Personal stack up against its major competitor, Ferox Microsystems's ENCORE!?

In reviewing financial modeling software for the PC, IPPSPPSPSOND 2.0.2 and Ferox Microsystem's ENDED 2.0.2 2.0 stand out among products designed to add the planner, a choice between these two quality products its very difficent obsequently to the product of the control obsequently that the key differences between them are different user interface styles and price (see "New Power Sylves and price (see "New Power Sylves and Profe (see "New Power Sylves (see "New Powe

White IFPS/Personal originally cost \$3,500 per copy and ENCORE! 5695, the price difference between them is less dramatic than it once was. As of April 15, the price of ENCORE! rose to \$895, while the price of ENCORE! rose to \$895, while the price of IFPS/Personal is now only \$1,500. If you huy in quantity, the cost difference is smaller per unit since Executom prices IFPS/Personal as low as \$475 in volume.

The more significant difference between the two products is in the user interface. ENCORE! requires a procedural or systematized approach to develop the model, while IFPS/IPersonal uses a nonprocedural or interactive approach.

IFPS/Personal's nonprocedural approach lets you develop the model in an interactive session. No knowledge of modeling mechanics is required and the sequence of commands is immaterial. This approach is well-suited to managers who want to concentrate on business as-

FACTFILE

ENCORE!

Frox Microsystems, Inc. 1701 N. Fort Meyer Dr. #611 Artington, VA 22209 (703) 841-0800 List Price: 5895 Requires: 512K RAM with two floppy drives, 384K RAM with one floppy and hard disk, DOS 2.0 or higher. CIRCLE 667 ON IREADER SERVICE CARD. sumptions and relationships.

The procedural approach ENCORE!
uses is best swited to those well acquainde with modeling and willing to work in
the structured, planned environment that
ENCORE! requires. To use this approach, you must understand such things
as the sequence of commands and how to
solve simultaneous equations. ENCORE!" supproach does result, however,
in improved documentation of the resuling model, especially when the model

will be turned over to an end user. The recommended configurations for each product are substantially different. IFPS/Personal requires a minimum of 512K memory and a graphics display adapter and monitor whereas ENCORE! requires 256K RAM and uses the monochrome monitor and adapter for both text and graphics displays. Obviously, if you need to upgrade your equipment to run IFPS/Personal, it would be a substantial investment. Those who already have at least 512K and a color monitor will find that IFPS/Personal will make it come alive with three-dimensional color bar charts. While not required for graphics output, ENCORE! can drive a plotter to produce high-quality graphs. Both products can drive the common dot matrix printers for draft-quality graphs.

Although both programs include most of the features necessary for financial modeling. ENCORE! has several potentially significant features not yet available in IFPS Personal: linear regression, sorting, and the current U.S. tax tables.

one feature the two products both have is better implemented in ENCORE! A well-documented and easy-to-use consolidation feature in ENCORE! allows your oadd, subtract, multiply, and divide one matrix with another. While IFPSy-Personal also allows matrix consolidation, the feature is not as flexible or well documented.

The choice is yours. -Ken Edwards

language. You can specify the number of iterations for each calculation or the tolerances within which the results must fall. The only two mainframe version features not ported to the micro version are Monte Carlo simulations and universal consolidation.

However, IFPSIPersonal does offer rather sophisticated consolidation features. This consolidation capability is crucial to large-scale corporate planning and modeling, since the models and results for different divisions and subsidiaries must be brought together to create the overall corporate plan.

One of the most useful features of IFPS/Personal is its ability to solve simultaneous equations. A relatively simple

IFPS/Personal offers almost the same analytical

functions as the mainframe version. The only two not

ported to the micro version are Monte Carlo simulations and universal consolidation.

problem, calculating a chief executive's booms as a percentage of the company's after-tax income is complicated by the necessity to deduct that bonus from the taxable income before you can find out what the after-tax income will be. Such a circular calculation would most semoke come out your spreacher tail FFSP-resonal can handle it with case. You don't even makes represents a simultaneous equation; it will recognize the problem and solve it automatically.

Goal seeking is one of the most sophisicated features available in modeling; besically, it is like sensitivity analysis in reverse. Instead of testing an independent variable to see the effect on the dependent particular to the effect of the effect as single-variable goal-seeking feature in the sereadsheet mode and allows wot to adjust



Figure 3: A report listing for a data file containing the Western Division's yearly totals. The data is stored separately from the model.



Figure 4: IFS/Personal created this chart from first-quarter cash flow figures.

the number of iterations and the convergence tolerance. should be adjusted to reach this revenue goal.

For example, In Figure 2, the goal is set in the bottom window to realize revenues of \$15,000 in January, with a 5 percent monthly revenue growth rate. I have specified that the independent variable, price.

The Presentation
Reporting is almost as important as

analysis, since it is the primary means of communicating the mode's results. IFPS/-

If you don't have a Hercules Graphics Card, you could end up looking like this:

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es cards.

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Figure 5: A model and spreadsheet for analyzing total cash disbursements.



Figure 6: The cash disbursement totals in report format.

Personal has an interactive report-formatting utility that saves the reports as separate files. You can select blocks of data for display, dress up the data using the standard formatting options, and rearrange or reorder the model's rows and columns. Figure 3 shows a report drawn from a sample data file. You can also enhance your presents-

tion with graphics. IFPS/Personal has an automatic graphing function that will produce scaled, colored charts from your data. You can select the variables you want graphed, starting and ending points, and other parameters. The program will produce pie charts, line charts, and four types of bar charts: two-dimensional clustered,

three-di-mensional clustered, stacked, and percent. Figure 4 shows a bar chart. Figures 5, 6, and 7 show the same information as a spreadsheet, a report, and a pie chart.

Unfortunately, although it supports several popular dot matrix printers, including the IBM four-color dot matrix, the program does not support any pen plotters. You can, however, buy an optional program, Sidelight, that enables IFPS/Personal to support the Hewlett-Packard 7470 two-pen plotter.

Litilities

IFPS/Personal includes several useful utilities that let you copy data files for later use or display them for examing. You can redefine the PC's function keys either for the duration of the modeling session or for permanent use in the program. Conveniently, IFPS/Psronal lets you run other program without exiting, and then return to the model you were working.

Manual Help

Modeling is not as easy to master as a spreadsheet; good techniques are developed through training and experience. To all the novice as well as the experience of user, Execucom offers an audio-visual demonstration, a comprehensive 528-page reference manual with an index constaining both the tutorial and the reference manual, which an index containing both the tutorial and the reference manual, and context-sensitive help screens the touch of the Fix (Fex 6) grams 8.

The tutorial is very well organized and clearly written. It will take most officebased users several days to complete but is well worth finishing in its entirety before using the product. Each lesson describes not only what you will do but also the files that you will need. In order to supplement the training ma-

terials, Execucom hosts training classes at its Austin, Texas, education center and in several major cities across the nation. In addition, on-site training classes are available on a contract basis. Included in its Customer Support Plan is one year of hotline assistance.

Unfortunately, the one thing the lengthy documentation does not include is an explanation of the financial modeling

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(7) Benchmark run on an 1954 PC using MS Placcal version 3.2 and the DOS linker version 2.6. The 179 has program used is the "Gaust Seldel" program out of Alan R. Miller's book. Placcal programs for constition and engineers (Sybex, page 128) with a 3-dimensional non-singular matrix and a releasation coefficient of 1.0.

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Dave Gariand, Popular Computing: "Most Pascal compilers barely fit on a disk, but Turbo Pascal packs an editor, compiler, linker, and nun-

time library into just 39K bytes of randomaccess memory."

Jerry Pournelle, BYTE: "What I think the computer industry is headed for: well

computer industry is headed for: well documented, standard, plenty of good feature and a reasonable price."

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process, which for first-time users might be essential. For those who need it, a useful reference work is Financial Model Preparation by Philip L. Blumenthal, Jr., CPA, published by the American Institute of Certified Public Accountants, New York. Blumenthal includes the following description of the modeling process:

- Determine the questions the model. is to address and the problems that are to he solved.
 - 2. Review the data available.
- 3. Select, eather, compile, and access specific data.
- 4. Analyze and test the data to determine relations and interactions and causes and effects. Such analysis should balance statistical methods with manual methods, plotting variables against one another.
- 5. Lay out a tentative model structure, both variables and relationships.
- 6. Review the tentative structure with client management and amend as appro-
- priate. 7. Write, code, debug, run, and validate the definitive model.
- 8. Review the first results with your
- client and then agree upon alternative assumptions. 9 Remn

 - 10. Reneat steps 8 and 9 as required. 11. Analyze results and present con-
- clusions.
- 12. Prepare explanatory detail and operating instructions, as required by the terms of the engagement.

The Right Tool for the Job

No program, however good, is absolutely perfect. Despite its sophistication. IFPS/Personal lacks several features that I would like to see added, including multivariable goal seeking, linear and multiple regression functions, Monte Carlo simulation, and built-in U.S. tax tables. It is also somewhat overpriced. In most areas, however, it meets the competition. (See sidebar, "IFPS vs. ENCORE!" for a comparison of IFPS/Personal with its leading competitor.)

If you buy a financial modeling product like IFPS/Personal, don't throw away your spreadsheet program. For quick analyses that don't require the power of modeling software you will be better served by



Floure 7: Using the cash disbursement totals, the program has automatically produced a colored nie chart.



Figure 8: A context-sensitive help screen explains the main menu choices.

your spreadsheet. If you think you are going to need the capabilities of modeling software, however, don't frustrate yourself with a spreadsheet product.

If your responsibilities include financial planning, you should definitely consider IFPS/Personal or a program like it. You

will get the job done faster and get quality results. Ken Edwards is a manager with the executive office of Touche Ross & Co. He is currently in charge of the firm's microcomputer support center.

Borland's SideKick Software Product of the Year*

SideKick is InfoWorld Software Product of the Year. It won over Symphony. Over Framework. Over ALL the programs advertised in this magazine. Including, of course, all the "fly-by-night" SideKick imitations. SideKick Simply the best.



Here's SideKick running over Lotus 1-2-3. In the SideKick Notepad you'll notice data that's been imported directly from the Lotus screen, in the upper right you can see the Side Kick Calculator.

Intelligent Report Card 1984 by Popular Computing, Inc., a colordoury of CB 0000 Communications Inc. Reprinted from Intelligent, 1960 March Road, 1111 Menio Park, CA :4025

All the SideKick windows stacked up over Lotus 1-2-3. From bottom to top: SideKick's "Menu Window", ASCII table, Notepad, Calculator, Appointment Scheduler/Calendar, and Phone Dialer. Whether you're running WordStar, Lotus. dBase, or any other program, SideKick puts all these desktop accessories instantly at your fingertips



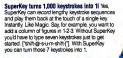
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draft, payable in US dollars drawn on a US bank

Long-Distance Computing at FULL POWER

any of you have made substantial investments in hard disks, RAM chips, tape or cartridge backup systems, and other information storage devices. But none of you can be rich enough or strong enough to carry around computers that can process and store all your data everywhere you may roam. Wouldn't it be great if you could couple the storage capacity of your stationary PC with the carry-ability of a portable computer?

Now you can. By assembling readily available hardware and software, you can have storage and portability, through remote computing. Remote, a software package from Microstuf (the company that has been so successful with Crosstalk communications software), gives you full use of your PC when you call in through a modem,

just as if you were using the local keyboard and monitor.

Remote configures your system so that the PC thinks that anything coming in through the RS-232 port comes from the keyboard. Conversely, anything the PC sends to its screen goes out through the RS-232 port. Anyone connected to the PC's serial port or modern with any of 32 different terminals or with a portable computer can both make inputs and see what is displayed on the PC's screen just as if the inputs had been made from the PC's keyboard. Remote also works with internal modern cards like the Hayes 1200B.

Remote has some limitations, mainly in the display. Sending a screenful of color graphics over a telephone line takes a long time. Remote works best with programs running in the PC's

With Microstuf's Remote, a modem, and some additional hardware and software, you can use your PC from afar as you would at home. Thus you can have the storage capacity of a PC and the portability of a laptop, too.



"text" mode—word processing programs, database programs, BASIC programs, database programs, BASIC programs, and the like. Although you can nun spreadsheets and other programs that address the screen in the graphics mode, the task of repainting the screen makes these programs operate slowly. (You might run into a few other display limitations, discussed later.)

A Fair Exchange

One thing Remote does well is exchanging files. If you use Crosstalk to call your host PC from your terminal or portable computer, Remote can transfer program and text files using automatic errordetection protocols. Since versions of Crosstalk are available for many different computers and operating systems, a host computer running Remote makes a good file translation device. You can use an 8bit machine running under CP/M to gain access to your host PC, for example, and then use Crosstalk to transfer the file from the terminal to the host. Remote can then translate that file into an MS-DOS format for the next caller.

Since the caller has full use of local programs on the bost PC, you can run a word processing program, for example, on the

Remote Microstuf, Inc.

1000 Holcomb Woods Parkway Roswell, GA 30076 (404) 998-3998 Price: \$195 Requires: 64K RAM, one disk drive (hard disk recommended), DOS 2.0 or later. CRCLE 684 ON READER SERVICE CARD

TURN-ON Skyland Systems, Inc. 150 Green Valley Road Scotts Valley, CA 95066 (408) 438-5007

Price: \$294 CIRCLE 693 ON READER SERVICE CARD

QUICKON Security Microsystems Consultants 16 Flagg Place Staten Island, NY 10304 (718) 667-1019 Price: \$69.99 CIRCLE 692 ON READER SERVICE CARD host machine and transmit text files from your local computer using any other communications program. The host PC thinks the characters are being received as input from the host's keyboard and saves them

accordingly.

The Remote package includes an excellent electronic mail system. It stores and

Remote has some limitations, especially in the display. Sending a screenful of color graphics over a telephone line takes a

forwards messages, sends delivery receipts, allows instant replies, and has many other features usually found in only the best electronic mail systems. So with one relatively small software investment you can get remote computing. file transfer, and professional electronic mail. The system also gives password protection and

personalized sign-on responses for indi-

long time.

vidual users.

Bulletproof

A PC running Remote has been my private information utility for several months. At work, a Zenith Z-150 "taps the well" whenever I need to exchange data or get augustes from the big system at home. A Radio Shack Model 100 works well as a seteminal for Remote; I have used mine to a couple of foreign countries. The system has proven to be relatively "bullettroof."

Only one thing bothers me: having to leave the PC running all the time on the chance that I might need to call in. A PC with two hard disks and an expursion cabinet makes an impressive (some might say oppressive) sound in a quiet house. It also heast up the room, not a welcome environmental addition during the summer; (Running the system for 24 hours, however, costs only 50 cents a day.)

TURN-ON

In my search for a way to avoid having to leave the PC on all the time, I experimented with a couple of home-brewed ways to make it turn on in response to a ringing telephone. But my success was imitted. I tried using an audio switch that would listen for the phone to ring, but the doorbell, the making and people taking also tripped it. I canceled out the idea of using a direct connection to the phone line since which regulates all such devices. Finally, that seeing an after TURN-ON, a device marketed by Slytand Systems in Scotts Valley, California, I had an answer, I had a naswer, I had a naswer.

TURN-ON is a talented power controller. For approximately twice the price of a surge suppressor with multiple outlets, TURN-ON gives you as urge suppressor, a power controller that turns on by sensing the switch setting of one of the devices plugged into it, a smart switch that can exchange RS-22 status messages with the computer, and a device that turns on the entire system when the phone rings and

shuts it down when the phone is hung up.

The TURN-ON module is pleasing to
the eye and well constructed. It comes with
manuals that explain all the technical details of the hardware and with a program
that has some Remote-like functions. The
TURN-ON Software, however, lacks the
multiple passwords, activity log, electronic mail. and other features of Microstut's

TURN-ON works as advertised. I plugged one of my monitors into the outlet labeled Sense and connected the other units in the PC system to the remaining five outlets. When I turned on the monitor's power switch, the whole system came alive. (This procedure is a great improvement over my hunting for six separate switches or stabbing around under the desk with my toe, trying to hit the main switch on my old power control box.)

Routing the phone line to the modern through the AC power control module seemed odd at first, but it worked. On the second ring TURN-ON fed the juice to all its outlets, even when the device that was plugged into the sensing outlet was off. (Obviously, you don't need to have a local monitor on for remote operation.)

Now when the phone rings, the computer comes on. I can dump data and pick up something new anytime, without keeping the system running and adding to the electric bill. Arousing the PC from a sound sleep, however, proved to be quite another problem.

Slow to Beep

If you've ever waited for an IBM PC with 512K of RAM to run through its power-on memory check, you know that the time from the start of the sound of the fan to the beep can seem like an eternity. The time seems especially long if you are on the calling end listening to the phone ring. The PC takes more than ten rings to run through its memory checks and shake itself awake and another nine rings to run through the AUTOEXEC.BAT cycle, set its clock, boot Remote, and present its sign-on menu. (Once the PC gets on the air, the Remote software, included in the AUTOEXEC.BAT file, greets you with the Remote menu.) Then the modern finally picks up the line, after about 21/2 min-

utes of ringing.

This situation isn't impossible, but it is awkward. Autodialing programs such as Crosstalk hang up by the tenth ring, and human patience runs out even earlier. I needed some method of waking up the PC

An auto-answer modern like the Hayes or its clones will answer the phone on the first ring if it senses that the host computer is awake. The host signals the moden using the data terminal ready line in the RS-232 cable. But fooling the modem into thinking the computer is ready by "jumpering" the cable wasn't a good solution since I didn't want to pay just to listen to the modern tone while the machine was waking up.

Some long-distance telephone carriers don't start billing until the called end answers. Some start billing a few seconds after a call is initiated, and whether the phone is ringing, busy, or answered, you pay. So no matter which billing system your carrier uses, you'll want he PC up and running as soon after the first ring as possible.

Ouick Booting

faster.

One wonderful thing about the PC industry is that someone seems to have thought of an answer to almost every problem. Security Microsystems Consultants makes a product called QUICKON that forces the PC to bypass its redundant, and nearly always meaningless, memory check in favor of a quick boot of the disk.

QUICKON is a small printed circuit card that is inserted under the main system ROM on the PC's motherboard. The QUICKON package includes the tool you need to remove the ROM. This job isn't

QUICKON forces the PC to

bypass its redundant, and nearly always meaningless, memory check in favor of an automatic quick boot of the disk

difficult if you exercise a little care. You can install QUICKON in about 5 minutes, and the device can probably save you hours of waiting over the life of the machine.

The PC has another memory paritychecking scheme that is active all the time, and so the chances of a RAM chip suddenly going bad and not being noticed are practically nil. And you can return the power-on memory check to operation by changing a jumper on the QUICKON board

How Quick is QUICKON?

With QUICKON installed, the PC's beginning beep comes about a second after the machine gets power. If the machine is powered on because TURN-ON detects a phone call, the disk drive starts turning by the third ring. By the fifth ring the AU-TOEXEC.BAT file is running, and the machine has set its own clock from an internal multifunction board. Remote loads on the sixth ring, and the modern answers the line on the eighth. The process takes about 50 seconds. This delay doesn't waste a paid minute for you long-distance callers who don't have to pay until the phone is answered, gives some security against random callers, and lets you answer the call by voice if you want to.

Details, Caveats

Your success and satisfaction in using this kind of remote data access system will depend to a large degree on the terminal you use to call into the system. Putting data on a screen in anything other than a line-st-a-time format (like that of a type-writer) requires using special codes that control the position of the cursor and other display functions. Reverse video, highlighting, screen clear, and other video characteries are commanded through special control codes that are received and interpreted by the terminal.

But not all terminals, or microcomputers serving as terminals, understand the same set of screen commands. The host program (in this case Remote) must send the right commands to format the screen properly on the distant end so that it looks as much as possible like what appears on the PC's screen.

Remote has a menu of 32 different terminals. It normally associates a caller with one type of terminal, but you can change terminals during the session.

The terminals Remote accommodates probably include 90 percent of the commonly used asynchronous terminats (including devices such as the Radio Shack Model 100). But if you want to use a unique terminal device, you should check with Microstati before you buy Remote. If Remote can't speak the language for Jur terminal, you'll get a very strange display on your recent. Remote will work with most PC terminal software practices; pre-terminal software protocol with PCs unminal Crosstatik.

Most data terminals have a 24-line display. The PC, however, has a 25-line display, and many programs use the 25th line to show status or a menu. If you are using a PC or a PC-compatible as a terminal, you to show that or a PC-compatible as a terminal, you you could quite conceivably miss someting. Remote attempts to help by allowing you to clip off either the top or the bottom line of the 25-line display. You must work with the software you are using on the host PC to determine which line you can afford

Remote can't help you if the terminal you are using doesn't display 80 columns of characters. Again, you have to work with the applications software in the host

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use of color to highlight various economic conditions and assumptions. . . the documentation is well written and easy to understand...I think you will find this program to be of value. . . —Computerized Investing Magazine, May June 1985

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REMOTE COMPUTING

machine or with horizontal windowing software in your terminal if the terminal has limited display capability.

Finally, some applications programs in the host PC may bypass DOS to paint the characters or images on the screen. According to Microsoft and IBM. this anproach is "nonstandard," but some software programs use special routines to address the screen directly for the sake of

Your success and satisfaction in this kind of remote data access system will depend to a large degree on the terminal you use to call into your system.

speed. These routines bypass the data paths established by Remote.

Microstuf has attempted to overcome this problem by giving Remote a special "screen mode" of operation. In this mode Remote reads the contents of the display screen and sends the caller an image of the screen. Anytime the screen is changed, Remote sends only the part of the screen that has changed. If the application program only changes a few digits, this system can work well. But if the program frequently repaints the entire screen, the transmission process can be slow and frustrating

Using the screen mode, for example, you can run a 1-2-3 spreadsheet on a Remote host, efficiently changing numbers and formulas in a single screen and quickly seeing the results. Every time you scroll the spreadsheet in any direction, however, Remote has to repaint the entire screen. This repainting takes a couple of seconds, thus reducing the efficiency of the operation. But the added time is a small price to pay for the ability to run 1-2-3 on your home PC while pushing the keys of a small portable in a hotel room a thousand miles

Frank J. Derfler, Jr., is a contributing editor to PC. PC MAGAZINE @ IUNE 25, 1985

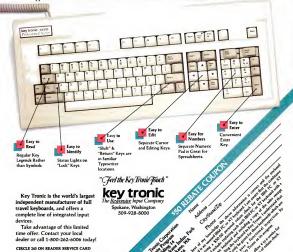
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Massive

The DPR-120-FT hard disk subsystem from IDEAssociates pulls together a winning team: a speedy 120-megabyte hard disk, 60-megabyte cartridge tape backup, and versatile software that makes it ideal for networks.

rom the looks of the latest add-on hard disk systems. PC suppliers have targeted network users as the biggest market in personal computing-or rather, as the market for the biggest

in personal computing. They know that most networks can't get enough megabytes. Consequently, they're launching big new disks with the fanfare normally reserved for battleships.

If you need massive storage capacity, you've got dozens of huge new hard disk systems to choose from. IDEAssociates has now joined the distinguished ranks of the Winchester century club with the IDEAdisk DPR-120-FT, a system that tips the scales at an awe-inspiring 120 megabytes when formatted. However, the new IDEAdisk is no lumbering giant-it's built around one of the speediest 51/4-inch Winchester drives available. To keep that giant friendly rather than fearsome. IDEA has matched the disk with a comparably large measure of security-a full 60-megabyte capacity 1/4-inch cartridge tape transport for backup. Although this pairing is the perfect an-

chor for your network, you can really plump up your own PC with it too. Be no plaything for the idle keystroker who only wants the best of everything. It's a professional's tool that requires more than a passing knowledge of IBM's scheme of things to put it to best use.

Unimposing Package

From the look of it, you might not suspect you could pack your favorite encyclopedia in the IDEAdisk DPR-120-FT's modestly sized box. It's about two-thirds the width of a PC system unit and somewhat shorter. The color is two-tone IBM beige, and the front-panel bezel matches both the slope and the look of the IBM standard (albeit made from plastic rather than a metal casting).

The IDEAdisk DPR-120-FT chassis holds the equivalent of two full-size disk drive slots. The compartment on the right side is loaded with a Wangtek cartridge tape transport, a half-height device, with its controller tucked underneath. On the left side is the Maxtor XT-1140 disk drive. A compact switching power supply shares the inside back panel with a large radio frequency interference suppressor and a small cooling fan.

Installing the IDEAdisk DPR-120-FT hardware is no more complicated than installing any add-on disk subsystem or peforewarned, however, that this machine is | ripheral. Pull the lid off your PC, slide a short, 5-inch expansion card into whatever slot you find vacant, and put your computer back together again. A 4-foot ribbon cable with overgrown

DB-style connectors at either end plugs into the IDEA expansion card and the back of the IDEAdisk DPR-120-FT. IDEA warns that it is essential to screw the conting parameters, such as the port addresses used by the system, they come factory-preset and do not normally require any tam-

A ROM chip on the card holds enough programming instructions to boot your system from the hard disk without a floppy in the A: drive. However, to bring the endrive unit inside the subsystem. And while the IDEA software gives you a choice of file allocation table size and the size in bits of each FAT entry, if you want to use DOS, you can't vary from the operating system's prerequisites. Try as you may, you can only work around them

DOS cannot handle the full 120 megabytes of the IDEAdisk DPR-120-FT as a single disk drive. Owing to the addressing limits of DOS, you must divide the IDEAdisk DPR-120-FT into at least four separate virtual disks or volumes.

IDEA gives you a great deal of freedom in dividing up the IDEAdisk. If you don't want to use DOS, you can divvy up the disk any way you want-you can even make some volumes DOS-compatible and fit others with more esoteric operating systems. If you do choose DOS, you can make each volume nearly any size you want, up to DOS's 32-megabyte addressing limit

The software also allows you to change the disk interleave factor (the number of physical sectors skipped between each logical sector) in the hard disk format. In theory, the lower the interleave, the faster data can be written to and read from the disk. IBM uses an interleave of six in the PC and three in the AT. IDEA's default is three. I tried the DPR-120-FT both ways and found a small improvement in read/write speed using IDEA's recommended number, but the difference was near the margin of error of the test program I used. According to IDEA, the interleave of three is optimal and there's no reason to bother with anything else.

The problem with the software is that it's many options will confront you with a severe case of overchoice. If you're new to the computing game or don't have much of a technical background, you may suffer from more than a bit of confusion. With the lengthy instructions in the accompanying documentation at hand, however, you should be able to get through the procedure without graying your hair.

To help you out somewhat, IDEA preformats all hard disks before they are shipped (though you'll still have to haggle with the installation software). Be aware, therefore, that the IDEAdisk DPR-120-FT is not a plug-and-play proposition, as many smaller add-in systems are.



nectors into their sockets. Although true pros are apt to ignore the advice, it is best heeded. The mating of connectors on the back of the test unit was loose at best, and you could spring a high-speed data leak just from missing an extra twist of the wrist

As an added precaution against noise and grounding problems, you must connect a separate black ground wire from the IDEAdisk DPR-120-FT to the chassis of your PC. The extra effort required to install it is minimal-as you're reassembling your PC after putting in the IDEA expansion card, just slide the lug at the end of the wire under one of the screws that holds on the PC's cabinet lid Although the IDEA interface card

holds two banks of DIP switches for set-

DPR-120-FT

IDFAssociates Inc. 35 Dunham Road Billerica, MA 01821 (617) 663-6878 List Price: \$9,995

RCLE 665 ON READER SERVICE CARD

tire capacity of the system to life, you must also install a software device driver.

Software Snarl

Software installation of the IDEAdisk DPR-120-FT is complicated but not intractable. It seems to be designed to suit the corporate computer guru rather than the individual who's never tangled with the innermost secrets of computing-factors like sectors, tracks, FAT (file allocation table), and interrupts.

The IDEA software is both more comnlex and more versatile than that of most hard disk subsystems. It gives experienced users more control over the hard disk than perhaps any other software in its product class. With it you have the option of changing a dizzying variety of parameters in the hard disk's format and its intercommunications with your PC. Moreover, the software is a universal product, canable of handling a wide array of different disk drive units and disk configurations.

Though the software gives you a wide variety of parameter choices, a number of constraints limit your selections. You can't set up your system to have more heads or platters than are physically built into the

Incompatabilities and Idiosyncracies IDEA seems to understand the primary

IDLA seems to understand the primary market for the IDEA Adis DPR: 120-FT and has designed its software with a splendid heard for the IDEA adis and the IDEA adis DPR: 120-FT and the IDEA adis DPR: 120-FT adis and the IDEA adis adis and the IDEA adis adis adis adiabatic part of the IDEA adis adiabatic part of the IDEA adis adiabatic part of the IDEA adiabatic part of IDEA adiabatic part o

relucian network connections. The system solvium is subily different from that of other hard disks, too, and in my system, suffered somewhat for it. I found that Peter Norton's file recovery utility would not operate with the IDEA disk. DEA for the IDEA disk driver should handle conventions may encounter difficulties, convention that per decounter difficulties, though the IDEA disk driver should handle and ordinary applications—1-2.3. Fraum-work, and the like—without problems. In fact, the other Poton utilities worked fine.

Unpublicized in the IDEA manual, the IDEA device driver creates and makes use of its own interrupt, specifically interrupt hex 60, which is reserved by IBM for such purposes. Although that fact in itself should cause you few or no problems-1 haven't encountered any other commercial program that uses such an interrupt-it did cause me great consternation. One of the files in my AUTOEXEC.BAT took charge of interrupt hex 60 for its own purposes. The result: Every time I started the IDEAdisk DPR-120-FT, it crashed and told me I had a scrambled file allocation table, one of those frightening messages that makes you wonder why you don't back up your files more often. Worse, nearly every attempt at hard disk access thereafter resulted in a Disk Error Reading, and when I tried switching to floppy, the same message confronted me even before the floppy started to spin. (That's what happens when you share interrupt between hard and floppy disk.) The cure was to avoid running my special program, so beware if you try

to be clever in the programs you assemble.

I found another incompatibility in that the IDEA device driver conflicts with the Tecmar Graphics Master board I normally use as a display adapter in my testing system. This time the result was on-screen

chaos that made serious use of the entire PC system impossible. If you don't have access to other display adapters, IDEA allows you to reconfigure the port assignment of the IDEAdisk to avoid such conflicts. My solution was simply to substitute a Hercules Color Card for the Tecmar, and it worked fine.

The Racer's Edge

The time gold of the IDEAdisk DPR 12DFT is yeard. When using it you When using it you was in immediate sense of its performance. The PC Luse for texting weighed down discovered to the processing yeard. But when I connected the IDEA-disk DPR-12D-FT to my high-speed system, it was so fast I couldn't distinuish accessing it from when I used a RAMdisk. Before my finger had finished the putch from pressing down on the Inter key, my disk commands had been carried out.

The IDEA interface card uses the 8-bit Dus rather than the AT's 16-bit bus, so it cannot transfer data to 16-bit systems in 2-byte gulps. In theory, the AT's internal drive should be twice as fast as the IDEAdisk DPR-120-FT at moving information.

On my normal test PC, performance proved hardly as spectecular, however, likely limited by the slower thinking of that computer. The objective measurements I made on my test PC did not conform to the subjective fast feel of the drive; the IDEA-disk ranked near the middle of the hard disk range, although the random reading time rates were a bit quicker than average.

IDEA uses several kinds of engineering

grease to make the system skate along fast when it has a high-speed computer to match, but the most important of them is checked by the system is built around. The Maxtor drive uses a vote-coil head positioner for one of the fastest access times in the industry, under 30 milliseconds. One telltale sign of the voice-coil head

positioner may be bothersome if you keep the IDEAdisk DPR-120-FT near your regular work area, however. Voice coils are named after the mechanism used in loud-speakers to move the speaker cone in and out and make noise. The same sort of mechanism is used to position the read/write heads of the Maxtor drive unit. As a result, when a head moves in the IDEA-

disk DPR-120-FT, you can hear it. In fact, when the system initializes at turn-on-time, it sounds like a Martian saying a cheery hello. Rather than the subdued ping most slower disk drives make when moving their heads, the IDEAdisk DPR-120-FT utters a noisy electronic cackle. Like gush from your PC's fan, it's the price you must pay for performance.

Backing Up

Any big hard disk puts a frightening amount of data on the line. An expiring resistor, capacitor, transistor, or IC can wipe out your system and possibly your data. A head crash looms even more likely.

To keep you protected, IDEA adds a state-of-the-art cartridge tape backup system to the IDEAdisk DPR-120-FT. The tape subsystem can back up an entire image of 30-megabyte-plus disk volume in streaming tape mode, or it can back up files or directories individually.

According to IDEA, the file-by-file mode is a efficient as the image mode at file storage. The company recommends that an image backup be restored only to the disk from which it originated and does not recommend attempting to use the image mode to move files between disks.

The Wangtek drive at the center of the tape subsystem uses nine tracks of serpentine (back-and-forth) recording to pack 45 megabytes on 3M Company's DC-300XL cartridge or 60 megabytes on a DC-600A. The IDEA software allows backups to be appended to those previously written to tape, so you can use every byte available.

IDEA includes a full set of tape utilities to handle all normal backup and restoration functions, including certification of individual tapes before their use.

The primary program for backing up is called IDEASA VE. It is men-driven and includes limited help facilities at the touch of a function key. In general, the software is easy to use. IDEASAVE allows selective backups by either DOS date stamp or archive bit (which indicates whether a file has been previously backed up).

However, there are some shortfalls, mostly in the documentation. After one backup, I encountered an error message with a numerical code, and I could find no mention in the IDEA documentation of what the mysterious code number actually

meant. I could find no means of eliciting subdirectory searches during backups—cither in poring through the IDEA documentation or experimenting with the software itself—so I had to back up each directory and subdirectory I used individually.

The image-backup program is commendably fast, backing up a 30-megabyte volume in 5 minutes and 10 seconds, which is on par with or faster than most similar systems. (The time required to make an image backup varies only with the size of the volume and does not change

with the number of files or bytes used.) File-by-file backups were much more lethargic. Packing one directory of 1,048,576 bytes and 74 files required 1 minute and 32 seconds. The effective backup rate of 11.40 kilobytes per second

is roughly two to three times slower than the speediest dedicated backup system I have tested. Appending additional directories to a tape will take even longer. Finding a bigger, better-built add-on

ries to a tape will take even longer.

Finding a bigger, better-built add-on hard disk than the IDEAdisk DPR-120-FT would take a long, thorough, and possibly

PC Magazine.

fruitless search. The software, however, still needs some taming before it can be called truly fired meldy. If you take the time to wrest with it, or can talk someone meld by the results. Although you could ask for more (everyone always asks for more), the DEAdskis DPA-120-FT is fully capable of filling most needs and networks for a long time.

FT Winn L. Rosch is a contributing editor to

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 Runs Lotus 1-2-3[™] and Symphony[™] in high resolution monochroma: 	-		-			_
-132 columnsx25 rows	-			-		
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 16 shades of green on the IBM monochrome monitor 	-	-				
Runs color softwara on the IBM monochroma monitor, full screen:	-	-				
-Flight Simulator	-	-				
-PC Paintbrush	-	-				
-PC Paint	-	-				
-PC Tutor	-	-				
Pinball	-					
-Without software patch needed	-					
Automatic Boot-up without software patch needed	-		-	-	-	-
Runs Lotus 1-2-3" and Symphony" in high resolution color:	-		1			
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Sidekick Puts Windows on WordStar's World

Swains of the original WordStar, take note: Sidekick's NotePad can give the old girl a lift. With a bit of cosmetic surgery, she'll be doing windows and subdirectories in no time.

don't care what you say about her; she's my rock and I ain't gonna throw her away. '' George Jones's sentiments may well be the official anthem for us fans of the original WordStar.

us tarts of the original works. Mr.
True, the old girl has been disparaged in
these very pages as a "dowager queen."
But treat her to a RAMdisk and a keyboard
enhancer and patch her tattered user interface, and the old girl can still give you
quite a kick. Sure, every so often you wish
he didn't have that morbid fear of windows, and, yes, she's too senile to understand subdirectories. But now a fearless

Sidebick comes to her rescue.

Like WordSidar, Sidebick is by no means the most feature-laden of its lik.

Other memory-resident "desktop" programs offer fancier calculators and appointment calendars, plus Robocks and instant-DOS features Sidebick lacks. But Sidebick's Noels die a superb Wordson companion. A memory-resident Wordson-Rosen lacks and the sidebick is the side of the sidebick is not plus plus program. Particularly for hard disk us-

crs, it's the windowing and subdirectory to Workfurn enceds. And more. And less. SideKick is RAM-resident, and to help with Wordfur it'll meed 100K or so. First you'll want to reinstall the NotePading with files bigger than 4K. Use the SKINST installation programs it's option and go for the max—full 50,000 (species, You'll knowledge with files help great pad 15,000 (species, You'll knowledge with files hoper than that, you're probably a main-other and the state of the

Avoid SKINST's command option. It poses 50 questions about assigning commands and won't let you quit until you've answered every one. Don't worry: Note-Pad comes with most of WordStar's old favorites.

Once you've reinstalled Sidekick, invoke it by typing Sk. I tested only the copyable version: the documentation claims the protected model needs to see the original floppy disk only when first called. After that, Sidekick waits in the background until you hit either the Ctrl-Alt combination or both shift keys at once. From there NotePad, Calculator, Calendar, Dialer, and ASCII Table are one keystroke away.

Setting Up

Expand or contract the NotePad window and move it around to wherever suits your fancy. Then use the setup menu to save a default size and place, and specify a default drive and notefile.

To use Sidekick, you'll need unimparied access to the unshifted function keys. If you've remapped them with a keybboard enhancer, you may run in problems. With ProKey 3.0, the solution is simple Use the 'escape' key (the singlequote beneath the tilde) before hitting the single-like the veste you need. To use an enhancer with no such escape, simplytouched and patch them directly in Word-Sar itself (though this method won't retain their consistency in NotePaul).

Big Differences

Sidekick is something like a handy wordSur that'll pop up from nywhere, but there are rather important differences between the two. Most obvious is word wrap, which is missing entirely in Note-Pad. Nor is there provision for multiple specing. Every line in a file you create with NotePad must be terminated by hitting the Enter key. To use WordSur to reform NotePad text, first perform a find-andraplace, substituting spaces for Cirl-N's.

Working in NotePad's overwrite mode is pretty much an exercise in futility. For some unknown reason, the Enter key won't take you past the final line, so stick to Insert mode for entering text.

There are no true tab stops. The tab key works as a sort of indenter, moving the cursor to column positions diagonally to right and below spaces on the line above. If

cursor to column positions diagonally to right and below spaces on the line above. If the line above doesn't have spaces in it, the tab key doesn't work.

Place markers don't exist. Ctrl-KQ exist the NotePad but doesn't junk the current file, to abandon it you have to hit F3 for New File and refuse to save the current one. Ctrl-KF doesn't get you a file directory. The Home and End keys don't work the way they do in WordStar. And Ctrl-R doesn't return the last value you enterly for such things as find-and-replace strings—the undocumented Ctrl-F, surprisingly, does.

Also missing is any kind of print formatter. Ctrl-KP will print the currently marked block (or the entire document if no block is marked), but Ctrl-PS underlining and similar commands go to the printer as raw control codes that generally just foul things up.

New Tricks

But NotePad offers a few tricks even WordStar doesn't know. Ctrl-KT marks a single word. Ctrl-QL undoes any changes you've made to the line you're on—but not, alas, after you've deleted it with Ctrl-Y or Ctrl-KY.

Ctrl-QI toggles an auto-indentation fea-



ture. When it's on and you hit the Enter key, the cursor lines up directly beneath the first character of the previous line. It's handy for lists and indented programs.

Ctrl-QG toggles the graphics mode on and off. It shows the high-bit characters WordStar's display suppresses and allows you to insert them into your file by holding down the Alt key and typing an ASCII number on the keypad. Be quick, though-holding down the Alt key for more than a second and a half before the first numeric press brings up Sidekick's main menu, at which point you might want to check the ASCII table to figure out what number goes with the character you want.

High-bit characters can be useful when you want to create boxes or special effects in something like a batch file menu. But remember: If you try to print (or even view) such a file with WordStar, you won't get what you expect.

Time, Date, and Sorting

Ctrl-OT writes the time and date into the file. Ctrl-QO does the same thing after moving the cursor to the end of the file. A .LOG in the first line of the file is supposed to perform a Ctrl-QO automatically every time you enter NotePad; it worked inconsistently for me. The time/date format is:

15:07:15 3/31/1985

Sidekick

NotePad's Ctrl-KS doesn't save text.

Borland International 4113 Scotts Valley Dr. Scotts Valley, CA 95066 (408) 438-8400 List Price: \$54.95 (copy protected); \$84.95 (noncopy protected) Requires: 128K RAM

CIRCLE 626 ON READER SERVICE CARD

WordStar 3.31 MicroPro International Corp. 33 San Pablo Ave.

San Rafael, CA 94903 (415) 499-1200 List Price: \$350 Requires: 64K RAM; however 128K is

recommended.

CIRCLE 625 ON READER SERVICE CARD

Instead it sorts individual lines in the currently marked block; you get to specify the relevant column range. This can be a delight for alphabetizing lists, but be careful: The sort is performed according to ASCII character sequence. Since capital letters come before lowercase and spaces earlier still, you can easily get a list like the fol-

Aardvark Abomination asource aardvark

abomination Foreign Imports

One nifty NotePad feature is its ability to import data directly from the screen-a

Where Sidekick really shines is in its ability to access files that don't happen to be in the current subdirectory. You can even use it to get a listing of the files in any subdirectory.

great time-saver. It's tremendously useful for vanking a DEBUG sequence, a bunch of DOS commands, or spreadsheet data into a file you can later massage with WordStar.

When you see what you want on the screen, you enter NotePad and hit F4. NotePad disappears to let you see all your text (except for line 25, which displays a less-than-informative Sidekick message). You can now move the cursor only one row or column at a time.

The rest of the process is much like a WordStar column move. Put the cursor in the upper left-hand corner of the block you want to import and hit Ctrl-KB. As you move the cursor to the lower right-hand corner, the marked area of text should appear in inverse video. (If you're importing from WordStar it probably won't, but that's no problem.) When you get to the comer, hitting Ctrl-KK takes you back to NotePad.

You're not done yet. To import the material you've just marked, you must hit Ctrl-KC-WordStar's COPY command. NotePad will disappear again, and the cursor will slowly inch its way along the section you want to import. Eventually you'll find yourself back in NotePad.

What you'll also find is that, as with a WordStar column move, the imported block has pushed text to the right instead of beneath it. That could be handy when you're trying to reconstruct a wide spreadsheet in two passes, but otherwise it's a pain. Solution: Move to the bottom of the file before you hit Ctrl-KC, and then move the block with Ctrl-KV.

Shining Subdirectories

Where Sidekick really shines is in its ability to access files that don't happen to be in the current subdirectory. You can even use it to get a listing of the files in any subdirectory. Hit Ctrl-KR (Read File) or F3 (New File), and respond to the prompt by specifying a path without a file. Be sure to include a backslash as the last character. For example:

\pc\articles\

When you hit the Enter key, you'll get a list of the subdirectory's files; if it's too long to display in the little window allotted for it, you can page through the entries with the PgUp and PgDn keys. If you see the file you want to use, you can move the cursor to it and hit the Enter key; if not, hitting Esc lets you back out. Incidentally, Sidekick doesn't seem to know about the current directory and generally requires full path specs to find files in it.

Sidekick's importation function works only one way-from screen to NotePad. But it's easy to send information in the other direction. Simply mark a NotePad block (or the whole file) with Ctrl-KB and Ctrl-KK. Use the Ctrl-KW command to write it to a file in the subdirectory WordStar is currently using. (After you've done this once. Ctrl-F will save time: it returns your last response to the prompt, so instead of entering the full path to the WordStar subdirectory, you need only backspace out the old filename and enter the new one.) Then exit NotePad, return to WordStar, and read in the transferred file with the Ctrl-KR command. This technique works fine from WordStar to NotePad as well.

You may want to use the NotePad window primarily as a "read-only" device. The documentation claims NotePad will

add a missing carriage return or line feed to any line not terminated by both. If true, this would create a problem in certain WordStar files (ones with nonprinting rul-

er lines, for example), but my copy of NotePad didn't work this way.

Another reason to reserve NotePad as a read-only window is to avoid control with read-only window is to avoid control when using it to examine a different section of a file you're working on in Wordston won't automatically appear in ston won't automatically appear in NotePad, and vice versa. To work with the most recent update produced by one program, you must save it and then load it into the other. If you save both versions, only let leatest will be stored under the proper filerance, the other will, in a convention as a BAA file.

Sidekick: Glitch Watch

The current version of Sidekick has its share of bugs. Get to know them, and they won't bite.

drive.

The first version of Sidekick I tried bugs I've ever seen anywhere. It would unpredictably lock up the keyboard afforce a power-down reboot, often when you'd simply walked away from the motine for a moment. Borland says every-body who bought those versions should have received a free upgrade by now.

have received a free upgrade by now.
The current edition (1.11c) is not exactly a paragon of purity either, but as long as you know where the problems are, you can probably work around them.
These are the most important ones I've found:

 Video vileness. The Sidekick manual seems to imply that if you install the program for "default mode" you can use a two-monitor system and blithely switch back and forth via normal MODE commands.

Don't try it. No matter how you install it, this version of *Sidekic* will only work with one type of monitor at a time. If you switch, *Sidekic* may do nasty things to the monitor it's not installed for, including the much-tumored possibility (denied by Borland) of death by overheating, especially with monochrome models. It's probably prudent not to use *Side-*

kick on a two-monitor system, but if you do, be very careful not to run it on the wrong screen. And be ready to hit your PC's Big Red Switch at the first sign of video anomalies.

If a file it needs is not on the default drive, Sidekick will try to access that drive anyway. If no disk is in it, you'll get a "Retry or Ignore?" message that won't go away until you stick a formatted disk in the drive and close the door.

Sidekick may change the current di-

rectory of a nondefault drive without notice. It's particularly annoying to those who use WordStar on a RAMdisk and copy files to a hard disk, because the files can end up God knows where. I now leave WordStar on the RAM drive and my working files on the (default) hard

 "Old" model 8088 microprocessors may cause unpleasant results, shough Borfand says the current version can take it in stride. That buggy 8088 can lead to problems with other programs too; if you've got one whose copyright stamp says "Intel "78" with no other date, it may be advisable to replace it with a later mode.

• The Dialer doesn't always hang up the modern when you hit the space bar as instructed, it once kept my phone deaf to the rest of the world for the better part of the day. Allowing a second or two before hitting the space bar offent, but not always, solves the problem. Outboard modem users will want to keep the off switch within arm's reach to clear the problem, with an inboard model, you can just hit Enter and redail.

 Entries made to the Appointment Calendar and the Setup menu don't "take" unless you press the Enter key at the end of each line. It's documented but easy to forget when you exit. So easy, in fact, that I stopped using the Appointment Calendar after a couple of missed dates

 The Dialer and the import facility of NotePad don't always highlight certain screen material properly. This problem isn't terrible but gives you a feeling of "flying blind" compared to the way Sidekick normally works.

-Stephen Manes

Some Extra Tips

The Sidekick calculator lets you take results from it and insert them into your text. Hit P, then another key (an Alt-combination is probably a good bet), and that key is assigned the number currently appearing in the calculator display. Back in Word-Surr, ap that key and the number will play back—highly useful for simple math within a document.

If you use a long-distance service, leave its number, followed by an @ (for a pause) and your code number, at the top of your default NotePad file. Then whenever you need to use the service, you can simply type in the appropriate phone number beside it and use the Dialer to pluck the number from the screen. And Sidekie works as a dynamite edi-

And Sidekick works as a dynamite editor in BASIC. Two shakes after saving a program in ASCII format, you can bring it into NotePad and massage it at will.

Sidelicki inn't perfect. It has plenty of little annoyances and plitches (see sidebat), and ramort has it that a fancier version complete with word wrap, DOS functions, and other goodies is in the works. Even the current cellich. nowever, offers the Word-Star user some major benefits. With a floppy disk-based system, I'm not entire sure I'd bother with it unless I desperately wanted a window. But with a hard disk, Sidelicki's cure for Wordsan's subdirect word problem based is virtually a most until Microlly to decides to give the old girl a facelift.

Stephen Manes is a contributing editor to PC Magazine.

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Appraising Job Performance

With the APPRAISL program, you can quantify the job performance of an employee (or your boss) on an inventory of 11 characteristics ranging from "dependability" to "personality."

eon Wortman's Business Problem Solving with the IBM PC & XT contains BASIC program listings, Pascal program listings, some fundamentals of both languages, and a discussion of the requirements for set-ling up a computer system for business.

Twenty-nine business-oriented programs are listed in the book; they cover such diverse tasks as counting the number of words in a report, calculating depreciation, computing business ratios, alphanumeric sorting and pristing, and plotting data on an x-y graph. A chapter is devoted to each program, and the introduction to each chapter describes how the program can be applied in a business setting and will be generated by the program. This chapter (recruited with the per-

mission of the publisher) describes the APPRAISL program. APPRAISL allows you to quantitatively measure 11 key characteristics of an individual's job performance and then provides a composite rating. The chapter includes a sample run of the program and APPRAISL program listings in both BASIC and Pascal. The factors used in an appraisal of an employee or manager tend to be a mixture of subjective and objective judgments. Objective factors are those that are based on hard facts—attendance and quantity of work, for example. Subjective factors include your opinions about attitude, ability to respond to change, personality, and optential for growth and advancement.



APPRAISL rates the subjective and the objective to produce reasonably reliable merit ratings for those persons for whom you are accountable.

Many of us tend to let one or two personality traits influence our views and judgments of a person. For example, if we have a negative "chemistry" concerning John Doe, we may feel he just can't do anything right. We may not like the way he talks-too loud-or the way he socializes-too much of a loner. This could make it difficult to be objective in our appraisal of his performance. On the other hand, we may feel that John Doe can do no wrong and, therefore, put a positive halo around him that he might not really deserve. The person doing the appraisal has to be aware of the well-known "halo effect" and make every effort to be totally fair in the appraisal.

APPRAISL has been written with these cautions in mind. To enhance your programming knowledge and skill, the program's code is provided in IBM-BASIC and IBM-Pascal. Both programs are highly interactive, and they run very much alike. Figure 1 shows a sample run of the BASIC version, with APPRAISL'S. prompts shown in bold type. After the program gives you a composite rating of the employee, you have the option of printing out a detailed hard copy of the evaluation like the one shown here in Figure 2.

After printing a hard copy, APPRAISL asks

WANT TO DO ANOTHER? 'Y' or 'N':

If you press N, the program ends. If you press Y, the screen clears and the queries begin again, asking for name, department, date, then through the 11 characteristics. The sequence can be repeated until N is entered.

An error trap is incorporated into the BASIC program's code at lines 870 and 880. If you make an error in the entries that results in a total score of less than 11 (1 point times 11), which is the lowest possible score, or more than 55 (5 points times 11), which is the highest possible rating, one of the following error messages is displayed on the screen. The error trapped at line 870 causes the following interven-

THE SCORE FOR J. JOHNSTONE IS BELOW 11. YOU HAVE MADE AN ERROR. PLEASE

REDO THE APPRAISAL.
*** Press ENTER When Ready ***

The error trapped at line 880 causes the following:

THE SCORE FOR J. JOHNSTONE IS ABOVE 55. YOU HAVE MADE AN ERROR. PLEASE REDO THE APPRAISAL.

*** Press ENTER When Ready ***

The code for the BASIC version of APPRAISL is shown in Figure 3a. The Pascal version is shown in Figure 3b.

PHARTEUS

Business Problem Solving with the IBM PC & XT Leon A. Wortman Robert J. Brady Co. Bowie, MD 20715, (301) 262-6300 Coyer Price: \$19.95 ISBN: 0-89303-282-4

CIRCLE 624 ON READER SERVICE CARD

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Description of Louise Of the Product Ty SE ARISE

THE THE THE CONTROL THE PRODUCT TY SE ARISE
BETTE THE CASE OF THE APPROACH ASSESSMENT THE CONTROL TH
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Figure 1: A sample run of the BASIC version of APPRAISL.

APPRAISAL OF: J. JOH	
DEPARTMENT: TECH I	
PPRAISED DN: 01/23	/83

DIM ITY	
KNOWLEDGE:	3
PRODUCTIVITY:	3
DEPENDABILITYS	3
INITIATIVE	5
ADAPTABILITY:	4
ATTITUDE:	4
ATTENDANCE:	5
SAFETY:	5
POTENTIAL:	4
PERSONAL ITY:	5
THE HIGHEST POSSIBLE	E RATING IS 55.
THE LOWEST POSSIBLE	RATING IS 11.
THE MID-RANGE RATIN	B 18 33.
THE MERIT-RATING FO	R J. JOHNSTONE 18: 45

INITIALS OF THE APPRAISERs

```
19 REM *** APPRAISL ***
29 REM 39 REM AN EMPLOYEE AND MANAGER
49 REM PERFORMANCE RATING FORM
59 REM ACCORDING TO 11 CHARACTERISTICS.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           779 FRINT" Now About Ability To Cet Along With Others. ";
788 APUT PERSON

"TOTAL THE RATINGS

818 RSM

"TOTAL THE RATINGS

818 RSM

808 SCORE : OUAL : NNOW. - OUAN - DEPEND - BUT - ADAPT

808 SCORE : SCORE : ATTIT - ATTEND - SAFE - POTEN - PERSON

88 RSM
                      REM
KEY OFFICES LOCATE 12,18
                      FOR L=1 TO SEPRINT CHRS(285);-NEXT
LOCATE 13,22:COLOR 15
                      LOCATE 1.33:COLOR IS PRINT APPRIAL PERFORMANCE-MERIT RATING FORM LOCATE 1.18:COLOR 7 FOR L-1 TO SPHIRT CHRISING, MEXT FOR L-1 TO SPHIRT CHRISING, MEXT FOR L-1 TO SPHIRT CHRISING, MEXIT PRINT CHRISING, CASCING FOR 7-1 TO SPHIRT CHRISING CORPORATION, C. COLOR FOR C. S. COLOR 7 C. S. 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               660 REM
668 REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  *** OUT-OF-RANGE ERROR TRAP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           878 IF SCORE < 11 TINEN 988
808 IF SCORE > 55 TINEN 1948
608 REM "IF S
918 REM THE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               *** IF SCORE IS WITHIN RANGE OF 11 TO 55.
THEN DISPLAY THE SCORE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           *** START COLLECTING INFORMATION.
                          REM "STAT COLLECTING BYGGMATION.

HOUT-ENTER THE HAME OF THE PERSON TO BE NATED. "JAME
HOUT-ENTER THE PERSON'S DEMATRICH NUMBER or DEPTH NATE OF THE APPRASAL (MMDDOYY) "DAYS
PERSON TO STATE ONE OF THE APPRASAL (MMDDOYY) "JAYS
REM "DEPTH OUDELNES."
   238
248
258
268
278
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               " IF SCORE IS MORE THAN 55,
DISPLAY AN ERROR MESSAGE.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1929 REM OSP-KEY AN SPROY MESSAGE.
1938 REM 1938 REM 1949 REMINICULOR 15 PRINT THE SCORE FOR "NAMS" IS ABOVE 55 "
1949 PRINT TOU HAVE MADE AN ERROR, PLEASE REDO THE APPRIAS
1949 PRIN "F SCORE IS OUT OF RANGE.
1949 REM REDO THE APPRIASA.
                          REAL PROPERTY TABLE TO THE CONTROLLED TO THE CON
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRINT AFTER YOU HAVE RATED THE TIM CHARACTERISTIC PROOF PRINTTAFF REBULT OF THE APPRAISAL CAN BE PRINTED. PRINTSPRINT REM. "START THE RATINGS. REM. "START THE RATINGS.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           *** IF SCORE IS WITHIN RANGE,
DISPLAY THE SCORE.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               THE RULE | THE PRINTERNIT NAME HAS A SCORE OF TSCHE

"REDUCET HAND CODY TO SEE DETAILS."

1156 PERINTERPUT NARD COPY PROVIDES THE DETAILS. Y or 'N'?"

1258 REM

"IF RESPONSE IS 'Y', START PRINTING.

1228 REM
       428
428
438
448
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HCS
   449 REM 199 COLOR 7
959 COLOR 7
959 PINIT* A - QUALITY**
459 INNIT* How Well Does "HAMS" Meet Quality Standards: ";
469 INNIT* B. JOB KNOWLEDGE*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1230 F HCS "Y" or HCS "Y" THEN 1316
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1246 REM
1250 REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               " IF RESPONSE IS NOT ", THEN
DIFFER OPPORTUNITY TO DO ANDTHER
APPRAISAL OR END THE PROGRAM.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1269 REM DEFENDED OF CHILDREY TO DO ANOTH 
1279 REM DEFENDED OF END THE PROGRAM. 
APPRAISAL OR END THE PROGRAM. 
1289 PRINT SPUT WANT TO DO ANOTHER? "O" N". MORES 
1289 F MORES -" OR MORES 3" THEN 178 ELSE 1819
AN PRINTED TO A CONTROLLED TO THE PRINTED TO THE PR
                                                                                                                "NAMS" Understand All Phases Of the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1318 LPRINT APPRAISAL DF. NAMS
1338 LPRINT OPPRAISAL DF. NAMS
1336 LPRINT OPPRAISED ON DAYS
1358 LPRINT APPRAISED ON DAYS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1306 LPRINT
1376 LPRINT
1306 LPRINT
1356 LPRINT
1486 LPRINT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DUALITY:
KNOWLEDGE.
PRODUCTIVITY
DEPENDABILITY:
INITIATIVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1428 LPRI
1436 LPRI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SAFETY:
POTENTIAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               14M LPRINT
14M LPRINT THE NIGHEST POSSIBLE RATING IS 55.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1586 LPRINT THE LOWEST POSSIBLE RATING IS 11."
1516 LPRINT THE MID-RANGE RATING IS 33."
1526 LPRINT THE MERIT-RATING FOR "NAMS IS "SCO."
   Quality:
750 INPUT POTEN PRINT
780 PRINT"K - PERSONALITY"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1538 LPBN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               *** SELECT RATING-RANGE
```

```
150 MEN FROM APPROPRIATE CONCLISION.
1514 MEN SCORE - 17 THEN SCHED
1514 SCHED
1514 SCORE - 17 THEN SCHED
1514 S
```

```
PROCEDURE
PROGRAM Appreis1(Input,Output) ;
                                                                                                            WriteSolidLine (VAR OutFile
                                                                                                                                                       : Text) ;
   HiSecCount = 24288 ;
                                                                                       [ The procedure and function bodies follow. ]
                                                                                       PROCEDURE CLS :
   Natural = 1 .. MexInt ;
StringType = LString(88) ;
                                                                                         Clases the screen. )
                                                                                      WAR

Count : Natural;

BEGIN { CLS }

FOR Count := 1 TO 38 DO

WriteLn (Output)
   Adaptability : Intager ;
Attandance : Intager ;
Attitude : Integer ;
                                                                                       ENO ; { CLS }
   Dats
Ospertment
                     : StringType :
                                                                                        MOCEDURE GenereteReport;
   Ospendebility: Integer ;
Initiative : Integer ;
                                                                                          Sum : Resl;
SIN ( GenerateReport )
WriteSolidLine(ListOut) ;
WriteSolidLine(ListOut,
    Knowledge
                        Integer ;
                     : Text ; ; StringType
   Name
Parsonelity
Potential
                     : Integer ;
                                                                                          Written(ListOut,

'Appreien of: ', Name);

Written(ListOut,

'Depertment: ', Department);

Written(ListOut,

'Appreised on: ',Date);

Written(ListOut);

Written(ListOut);
   Quelity
Quantity
Sefety
                      : Integer :
                     : Integer :
                     : Integer ;
   Score
                                                                                           WriteLn (LietOut
  The FORMARD declarations ere s list of all procedures ] and functions defined in this program. They are ] listed in elphabetical order for sess of reference. ]
                                                                                          WriteLn(LietOut,
Quelity:
WriteLn(LietOut,
Enowledge:
                                                                                                                            ',Quality);
The procedure and function bodies follow this eaction, also in sighabatical order.
                                                                                                                            ', Knowledge) ;
                                                                                           WriteLn(ListOut,
Froductivity: ',Quantity);
                                                 ( Clser the ecreen )
                                                                                           WriteLn(LietOut,
FORMARO 2
                                                                                                        Dependability: ',Ospendebility) ;
                                                                                           WritsLn (List
PROCEDURE
                      GenerateReport ;
                                                                                                        Initietive:
                                                                                                                            ', Initiative) ;
                                                                                          WritsLn (ListOut,
Adeptebility: ',Adeptebility);
BROCEDURE
                      GstAppraissl :
                                                                                           WriteLn (ListOut,
FORWARD :
                                                                                                        Attitude:
                                                                                                                             '.Attitude) :
                                                                                          WriteLn (ListOut,
                      GetFralimDate :
                                                                                          Attendence:
WriteLn(LietOut,
Sefety:
                                                                                                                             '.Attendance) ;
                                                                                                                            ',Safaty) ;
 PROCEDURE
                      GatRestAppreisal ;
                                                                                          WriteLn (LietOut,
 FORWARD 1
                                                                                                                            ',Potentiel);
                                                                                                        Potentiel:
 PROCEDURE
                      SignetureLing :
                                                                                          WriteLn (LietOut,
                                                                                                        Fersonelity:
                                                                                                                            ',Personelity);
                                                                                          SignOn ; { Print the eignon benner }
 PROCEDURE
                      WeitASecond :
                                                                                          WriteLn(LietOut,
                                                                                                 The mid-range rating ic 33.')
 PROCEDURE
                      WriteGuidelines :
                                                                                          WriteLn (LietOut,
 FORMARO ;
                                                                                                'The merit-reting for ', Name, ' ie ', Score) ;
```

Figure 3b: The Pascal program listing for APPRAISL.

IP (Secre <- 12) THEN **MINITELLISATION: **Mane, ' 1s s' 'poor'* performer.') **ELSE IP (Secre <- 22) THEN **Witteln(ListOut, ') **ELSE IP (Secre) unit of a by, Seeds belp.') **ELSE IN IT (Secre) **ELSE T. NOTE (Secre)	PROCEDURE GalbertAppraisal; BEN (Intelligence of the Company of th
Writeln(ListOut, Name, does an acceptable job.') ELSE 17 (Score <- 49) THEN Mriteln(ListOut, Hame,' is a good performer.')	WriteIm(Output,'] - POTENTIAL FOR ADVANCEMENT'); Write(Output, 'Now do you rate ',Name,' for leadership quality: '); RaadLm(Imput,Fotential); WriteIm(Output);
ELSE WriteLn(LiatOut, Nama,' is an exceptional person!'); WriteLn(LiatOut); WriteSolidLine(ListOut);	Mritein(Output, "R - PERSONALITY"); Write(Output, New about ability to get along with othera: Readin(Input,Personality); Writein(Output)
SignatureLine ENO; (GanarateReport) PROCECURE GatAppraisal:	END; [GetReatAppraisal] PROCEDURE SignatureLine; BMGIN (SignatureLine) WriteLn[ListOut); WriteLn(ListOut,
BEGIN { GetAppraisal } WriteLn(Output, 'A - QUALITY') ; Write(Output, 'Now well does ', Mame, 'need quality standards; ') ;	'initials of the appraiser;'); WriteEn(ListOut); ENO; { SignatureLine }
ReadLn(Input,Quality) ; MriteLn(Output); Write(Output, 'B - JOS MENLEDGE'); Write(Output, Oosa',Nama,' understand still phases of the work; '); ReadLn(Input,Knowladga); WriteLn(Output);	PROCEDURE SignOn ; (Frint the startup message) BEGIN [signOn] (Krite the startup measage to the acreen] CLS ; Write.infOutput,
MriteLn(Output, 'C - QUARTITY'); Mrite(Output, 'G - QUARTITY'); 'Is productivity or output at the proper level: '); ReadLn (Input,Quantity); MriteLn(Output);	Writelm(Output) ; Writelm(Output,
Maidan(Input, yountly) Writein(output) Writein(Output, 'O - GEPENOABILITY') Write(Output, 'Nork according to instructions: ') Readin (Input, Dependability) Writein(Output)	"APPRAISE Performance-Merit Eating Porm'); Writein (Output); Mritein (Output, """"""""""""""""""""""""""""""""""""
MritaLn(Output, 'E - INITIATIVE'); Write(Output, 'E - INITIATIVE'); Voea ', Name,' originate constructive action: '); ReadLn(Input, Initiative); WriteLn(Output);	WaltASecond ; Write (Output, "Copyright 1982, Success Analysis Corporation, "); Writein(Output, "Palo Alto, California.");
WriteLn(Output, 'P - ADAPTABILITY'); Write(Output, 'Ability to learn and adapt to changea: 'Badin(Input,Adaptability); WriteLn(Output);	WaitASecond EMD; { SignOn } FROCEDURE WaitASecond;
WriteIn(Output,'G - ATTITUDE'); Write(Output, 'Willingmeas to cooperate and meet demanda: '); RaadIn(Input,Attitude); WriteIn(Output);	VAR Count Integer; BBGIN WaitAFecond FOR Count: = -Wastant TO HiSacCount DO MDLL MDLL MDLL MDLL
WriteLn(Output, '8 - ATTENDANCE'); Write(Output, 'Now do you cate attendance and promptmeas: Readun(input,Attendance); WriteLn(Output);	PROCEDURE WriteGuidelines; BBGIN { MriteGuidelines } WriteIn(Output,
GatRestAppraisal EMD ; [GetAppraisal]	"You will appraise ", Name," for 11 key characteristics."); Writelm(Output, 'The value-scale for each characteristic is ''1 to 5''.');
PROCEEDER defreilabeta ; BEDIS [Geffreilabeta] Write(Output, Bedis [Geffreilabet	Withen[Output] Prind(Output, "1" Same "Property prind(Output, "1" Same "Property prind(Output, "1" Same Same Same Same Same Withen[Output, "Acceptable.") Withen[Output, "Same Same Same Same Same Same Same Same Same Same Same "Same Same Same Same Same Same Same Same Same "Same Same Same Same Same Same Same Same Same "Same Same Same Same Same Same Same Same Same Same "Same Same Same
Writein(Output) ; Writein(Output) ENO ; { GetPralimData }	'Tou must rate all ll characteriatics from ''l' to ''5''.'); WriteIn(Output); MriteIn(Output,

```
After you have rated the lith cherecteristic');
WriteLn(Gutput,
the result of the appraisal can be printed.');
WriteLn(Gutput); WriteLn(Gutput)
CND; [WriteGuideline)]
                                                                                                                                                                                                                                                                                                   MaitASecond ; WeitASecond ; WeitASecond ;
TestCher := 'y'
                                                                                                                                                                                                                                                                     ELSE IF (Score > 55) THEN
BEGIN
                                                                                                                                                                                                                                                                                            Mritein(Output,
"The ecore for ',Name,' is above 55.') ;
                                                                                                 ( (VAR OutFile : Text) } ;
       This procedure writes a solid line to OutFile. }
                                                                                                                                                                                                                                                                                            WriteLn (OutFile,
 END : { WriteSolidLine }
           IN [ Apprais1 ]
Assign(ListOut, 'PRN') ;
Revrite(ListOut) ;
                                                                                                                                                                                                                                                                     FLEE
                                                                                                                                                                                                                                                                                            Writeln ; Writeln ;
             SignCn ;
                                                                                                                                                                                                                                                                                          Writtedin; Writtedin; Mrittedin; Mrittedin; Mrittedin; Man e moore of ", Score); Mrittedin; Mritted
             REPEAT
                        GetPrelimDate ;
                        WriteGuideLines :
                          GetAppreisel ;
                                               := Quelity + Knowledge + Quentity +
Dependebility + Initiative + Adaptability +
Attitude + Attendance + Sefety + Potential +
                                                                                                                                                                                                                                                                                            Writele ;
                                                                                                                                                                                                                                                                                            write
                        Personelity ;
IF (Score < 11) TBEN
                                                                                                                                                                                                                                                                                                                                "Went to do another? """" OR ""N"") ;
                                                                                                                                                                                                                                                                                                                     ReadLn (Teet Cher)
                                    BECTN
                                                                                                                                                                                                                                                                                UNTIL (TeetCher IN ['N','n'])
D. [ Appreiel ]
                                             ' eppreisel.') ;
                                                                                                                                                                                                                                                                                                                                                                                                                                       (Figure 3b ends)
```

COMPUTER WAREHOUSE



At the Smithsonian Air and Space Museum, two men are developing a system that may save countless photographs and documents from rotting away in archives across the country.

Preserving the Past on Disk

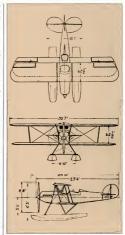
ny scholar who has descended into the morass of a poorly maintained archive—rotting papers in boxes, mildewed photos in decaying albums, and other mementos of great intellects—has experienced horrors worse than any described by Edgar Allar Poc.

A recently developed system consisting of a digitating camera, a PC, of fieth-selled software, videodists, a videodists a videodist and the could be the solution to this research nightmare. This combination of could be the solution to this research nightmare. This combination of ing. or paper document to be easily digitally encoded, stored, retrieved, and widely distributed, with the handwritten notes and curlicue typefaces preserved. It has already dawn are reviews from museum directors and other archive denirenes who 've seen it, for it promises to the control of the

The system is being assembled by Hernan Otano and Rob Martella of the advanced projects division of the Smithsonian Institution's Air and Space Museum in Washington, D.C., who pursus their work in a museum basement 50 feet beneath. Lindbergh's Spirit of \$1. Louis airplane. For the moment, it's called the System for Digital Storage and Retrieval, but Otano admits a more poetion ame is required. Perhaps "The Maven"?

Once upon an afternoon dreary in October 1983, Walter J. Boyne, the dynamic director of the Air and Space Museum (fie's the man who has commissioned the construction of a giant flying dinosaur to swoop around the Capitol mall) was thinking hard about the Smithsonian's charter.

"We are required by the charter to increase and diffuse knowledge," he says. "Through the years, we've had a lot of aviation scholars coming in to look at the heart of our collection, which consists of well over 2 million photographs—everything from the Wright brother's flight to Voyager's photographs of Satumand countiess millions of schematic drawings and written documents. But it want leasy for them, first shelp had to comments, but it want leasy for them, first shelp had to archival retrieval process." The standard process essentially involved asking a librarian todd frough the stacks."



An example of the printout quality produced by the Smithsonian's System of Digital Storage and Retrieval.

of paper until the desired item was found. If a photograph was sought and the researcher wanted a copy, the museum charged \$5. The whole search-and-copy process required days, even weeks, and

perhaps hundreds of dollars.

If a Smithsonian search was tough, Boyne realized, a search through papers held by smaller museums around the country was truly brutal. The personal papers of an aviation pioneer might be stashed in a file cabinet or cardboard box in a back room, with no order, no index, and worst of all, no atmosphere control to prevent acidification and rotting.

Boyne called in Otano, and together they decided that they wanted a computerized system to store photos and documents bectronically in their original form. Boyne explained, "We wanted our system to incorporate five principles: easy acquisition, mass storage, automatic indexing, easy retrieval, and cheap distribution. We also wanted it all done with off-the-shelf

Messy, disorganized archives can be as easy to access as any top-quality database.

equipment, so we wouldn't get locked into using one supplier." And Boyne also wanted the acquisition equipment to be portable, so that not only the Smithsonian's own collection, but also those rotting, far-flung archives could be rescued.

"Our idea was to use college kids, give them a little training, and send them into the field to capture everything in those archives," he says.

Otano, an Air and Space Museum staff member since 1972, was accustomed to realizing the impossible dreams of administrators, the hard fully automated and digitized all of the museum's audiovisual exhibits and designed half-a-dozen than innovations that rode the crest of the newest waves of hardware and software. Otano tackled the archives problem by searching trade shows for equipment and software that would be suited to the task.

Assembling a Prototype

At one of the first trade shows he visited, Otano made a key find—a digitating camera, complete with software, from California-based Datacopy Corp. Point it at a photograph or document, press a butnon, and the whole page is encoded diginally—the precise term is bit-mapped—in less than 3 seconds at a resolution of 200 dots per inch. The captured images can be stored on hard disks. relet tare, or any other



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high-capacity memory device.

Meanwhile, back in the basement office, Rob Martella was experimenting with various configurations of equipment brought back by Otano. A year after the easel, illuminated by two high-intensity

first conference with Boyne, Otano's assiduous shopping and Martella's diligent testing vielded a working prototype.

The storage system begins with an

quartz lights, with the digitizing camera aimed at it. A document or photograph is placed on the easel; the operator presses a button and captures the image digitally, then checks it on a high-resolution monitor. "The main reason we have the monitor is to be sure we don't record the thing upside down," says Otano. At this point the system also automatically assigns an access code number to the bit-mapped



image. "The operator can also add comments. If the document is water-stained, faded, whatever, the operator can note that."

The image is stored on a Winchester hard disk in a PC and on a reel-tape backup. The disk is then transferred to an optical disk for easier transportation. If the acquisition session is taking place at a remote location, this optical disk is then sent back to the Air and Space Museum, where technicians will check several frames to be sure everything is okay. "If we find a mistake-say we lost half the disk for some reason-we can simply restore that from the reel backup," says Otano

If everything checks out, the optical disk is sent to a mastering facility. A videodisk master is made, and videodisk copies can then be cranked out for \$15 a piece. The Smithsonian then offers them for sale at \$35 each, the profit going to recover development costs. Each videodisk can hold copies of 50,000 photographs or 100,000 documents on each side.

As of this writing the Smithsonian has not yet made a trip into the field, nor has it stored written documents, but it has started storing its own collection of photographs-some 300,000 have been recorded on three videodisks.

The photograph-accessing system consists of a videodisk driver program written by Visual Database Systems combined with dBASE II. which runs on an AT (Otano says an XT or compatible would work as well). Operation is simple: insert the



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"Undo" To Eastly Restore Text		1	1	V
Built in Telecommunications				V
Spelling Corrector*	1	1	/	V
Mail List Manager				V
Windows Onscreen		1		V
Math Built in			1	V
Alphabetic And Numeric Sorting Within Document				V
"Macros" For Recalling Often Used Command Sequences	1		1	V
Supports Over 100 Printers				V
Experience With Over 1.3 Million Owners				V







"aircraft photos" videodisk, type an aircraft model number-say, B-17-and a list of 20 categories of B-17 photos pops up on the screen. Select the "battle-damaged" category, for example, and all 26 of

the museum's photographs of battered, blasted, and bombed B-17s roll past at 5 seconds per frame. Select the one you want, choose the print option, and a thermal printer spits out the image. The Air

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and Space Museum already has several of these videodisk-PC-monitor-keyboardprinter setups in its research library in the museum's west wing. Scholars can tap in their requests and receive prints for 40 cents aniece. "The resolution is not perfect, but it is good enough for reproduction in a newspaper, and certainly good enough for most scholarly applications," says Otano.

But photographs do not a library, or even an archive, make. While it is a fairly simple task to capture and code photographs to render them accessible through dBASE II and a souped-up videodisk driver, the real challenge is doing the same with printed materials.

With a few clicks, a half-million pages of papers can be encoded. dumped from buffer to buffer, and eventually stored on videodisks.

Indexing the Text Suppose, for example, the Air and Space Museum uses this system to capture the papers of famed rocket scientist Wemher Von Braun (this is a safe supposition-museum technicians plan to go to Huntsville, Alabama, in 1985 to do exactly that). With a few clicks, a half-million pages of Von Braun's scientific papers. correspondence with fellow engineers. and personal notes can be encoded, dumped from buffer to buffer, and eventually stored on videodisks. They will be in "rough order." since during the capturing process technicians tried to store the papers in some semblance of the order in which they were produced. But it is inexact, because assembling them in perfect chronological order would be time-consuming, and it would be impossible in the case of undated material.

So what we have now is a complete, compact, rather disordered collection of Von Braun's work on videodisk, and it is virtually inaccessible. Clearly, an index is needed- but how do you index a halfmillion frames of images? By translating the pictures of words into ASCII code. For



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this task Otano needed a fast, flexible, accurate optical character recognition program. He found one; again it was from Datacopy.

The frames are run through the OCR

program, and then the resulting ASCII code is run through an indexing program—Otano has chosen XyIndex. "Then you just select a word or phrase. If you want Von Braun's papers that refer to the

V-2, just type V-2, and it will retrieve each place in the papers where the term is used," he says. "The system can be linked to give you either the ASCII translation or the original digital image-frame, or both."

Otano picks up a book. "This book is about balloons. It has been digitized and run through the OCR. We'll pick a word." He selects the word Gulliver, used by the author to describe the gigantic proportions of a particular balloon. "You just type that word in. The program gives you the chapter in which the word appears, then goes to

The life's work of the Wright brothers can be squeezed onto a single videodisk and purchased for \$35.

the page and highlights the word." A page of ASCII-translated text pops up, and there is the highlighted word. If the reader cares to, he or she can also refer to the original bit-napped image of the page. "You would want to see the original page been able to recognize some words, which would leave blanks in the ASCII translation." You see explained.

The result of Otano and Martella's work is complete indexed text retrieval at minimum cost. "All along, what we have had in mind is the rural library with limited funds," says Otano. "We could have done it all with high-end, specialized stuff, but we worked hard to make the retrieval system totally off-the-shelf." A library can spend perhaps \$10,000 for the accessing hardware and software, then purchase videodisks from the Air and Space Museum. The life's work of the Wright brothers can be squeezed onto a single disk and purchased for \$35. For \$350, a library could buy ten videodisks containing a set of 1 million Air and Space Museum photographs (actually, photograph-videodisk sales have already begun-some 300 have been sold so far). And if \$10,000 is too steep a price, the library, or any individual, could use a modern to call up a database that Otano plans to put on-line as soon as

enough text has been captured to make the

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Preserving the Past

As word about Otano's system spread along the international archival grapevine, administrators began flying to Washington and asking for demonstrations. "We've had the British Museum look at it. Deutsches Museum, museums in Japan and Canada, all of the other Smithsonian museums-I hate to tell you this, but even the IRS has been by to look at it," says

One of the most recent visitors was Susan K. Martin, director of the Milton S. Eisenhower library at Johns Hopkins University in Baltimore. "I was very impressed," she says. "We have many of the same problems that the Smithsonian has with deterioration of older manuscripts. The [preservation] technique that's been used for the last 40 years is microfilming, but it is not anybody's favorite medium to use for research. The Smithsonian's system is much more flexible '

James Cogswell, head of circulation of Princeton University Library, agrees. "I have seen the two major advanced systems that the United States Government is putting together for mass storage: the one at the Air and Space Museum and the one at the Library of Congress. I was impressed by the fact that the Air and Space system is very much a hands-on system; it's being developed in-house by the museum's own people using their own

Otano's system, with its automatic indexing, will provide easier access than the Library of Congress's.

expertise. The Library of Congress system is tackling a similar problem through contractors."

Cogswell says Otano's system, with its automatic indexing, will provide easier access than the Library of Congress's. But, he adds, "I can see both sides." He says Otano's system has a small enough universe-only Air and Space materials-to make automatic indexing work-

PC MAGAZINE • JUNE 25, 1985

chaos that is all the world's publishing, you are going to need a human intermedi-

ary." Such an intermediary would, for example, make sure that materials on the-

able. "But if you are working with the | ater and theatre are grouped under the same heading.

Boyne says his original plan had been simply to develop a private system for his own museum. "But when we began to

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hear the praise and the ideas rolling around in these other people's heads, we decided to seek a patent." The patent is now pending. If it is granted and licensed to manufacturers, Boyne says, the Air and Space

Museum will simply plow any profits back into the work of the museum. Martin, among others, says she is "anxiously awaiting" the day when the system becomes available commercially so that one

can be installed for use in her library. Otano and Martella are still refning the basic system. Otano can dorft-de-shelf camera elements, software, and monitors that yield night per software, and monitors that yield excited about the possibility of vectorizing escapility of septimages of line drawings rather than bitmapping them. Using the AutoCAD program from AutoDesk, the drawings would

up less storage space and also permits easy modification of the drawings. "We had a Pundits have predicted a paperless world for years, but our planet overflows with accumulated

be stored on disks as a series of equations rather than as bits. This vectorizing takes

guy in here who wanted to use a system like this for skeletons," says Martella. "With AutoCAD, he could not only keep huge file of skeletons, but he could also stretch and change the bones and view the image from different angles."

A Bridge from Paper to Disks

History will judge the significance of the work going on in the basement of the Air and Space Museum, but one implication is obvious. Pundits have proclaimed the coming of a paperiess world for years, but our planet overflows with documents that have accumulated for centuries. To make the leap into paperlessness would require us either to abandon our written past or conscript millions of keypunchers to type everything into ASCII code. Otano's work points the way to a third alternative-automated ASCII translation combined with mass storage and easy retrieval. With further refinements of the technology, especially in the sophistication of OCR and indexing software, a variation on the Air and Space Museum's system could someday provide the crucial

bridge between ink and electrons.

And in the meantime, the gratitude of scholars will be boundless.

Brad Lemley is a free-lance writer with extensive microcomputer experience.



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A Bar Chart For All Reasons

With these six programs and the customizing modifications you can make to them, you can create bar charts to display nearly any two-axis data.

If fiting a program to draw a bar chart is more than a matter of drawing a few rectangles, the values that are to be represented by the bars must be easiled to fit the graphics screen. More calculations are then necessary to determine the magnitude and placement of the values in the vertical axis and of the titles in the horizontal axis. And finally, a good program must allow for calculations are considered as the contraction of the centre chart.

largement and reduction of the entire chart. This month's column presents six programs you can use to construct six different types of har charts. While the programs are ready to use as is, I have also included an explanation of the methods employed, so you can easily ensotemize them. Indeed, so you can easily ensotemize them. Indeed, used in these programs can be directly applied to almost any graphic figure in which data is displayed using two axes, for example, to functions, lines, and flooded resions.

Scaling the Bars

Any useful bac chart program must be able to scale a wide variation in values so that the bars can be meaningfully disable to scale a wide variation in values so that the bars can be meaningfully disable on the computer screen. To facilitate explanation, let us first suppose all the values to be represented are position and values to be represented are position problem. very small numbers and numbers larger than 199 (the begin of the IBM C screen) must be scaled. It is necessary that the value, vickly 199, By simple largest value, vickly 199, By simple largest value, vickly 199, By simple largest value, vickly 199, By simple and the value of value of values of v

1985/No. 13



value will become 199, zero will still be zero, and the rest of the numbers will be scaled accordingly.

The point 0,0 is at the top-left corner of the screen, and positive vertical components grow downward. This would cause the bur chart to appear upside down. To straighten it up, you just subtract every vertical component from the maximum value that a point may have in the vertical and the subtraction of the subtraction 199 — V for every value of Y results in a bar chart with the correct visual orientation.

The previous calculation assures that the largest bar will extend to the full height of the screen. This, however, is not always convenient. Suppose, for example, that the values to be shown are 998, 999, and 1000. The 1000 will be represented by a bar exactly 199 pixels high, but the others will have practically the same beight. A

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PROGRAMMING

second type of scale mapping is thus necessary to adjust the minimum value for the bottom of the screen. Obviously, the smallest value should produce the lowest bar. If the value of the minimum bar is subtracted from all the values, the minimum becomes zero (MIN-MIN=0) and all the other numbers are shifted an equal amount. The scaling factor should be calculated not from the maximum value alone but rather by using the maximum minus the minimum, that is, using the distance between the largest and the smallest numbers (MAX-MIN).

In summary, these are the steps necessary to scale the numbers, taking into account the minimum and the maximum:

- 1. Find the distance between the largest and smallest numbers (D=MAX-MIN). 2. Find the scaling factor (FACTOR =SCREEN.BOTTOM/D).
- 3 Subtract the smallest number from every number.

4. Multiply every resulting number by the factor

Program 1: Getting Started

The rather simple bar chart program listed in Program 1 incorporates these principles. You will note that in step 2 the factor is found not with the absolute bottom of the screen (199) but with the value SCREEN.BOTTOM. This permits constructing graphs of varying heights. The screen is 200 pixels high and the horizontal axis is drawn in the 199th line, but the scaling is done in Program 1 as if it were only 190 pixels high. This is done so that the smallest number will not be represented by a line (a degenerate bar) that lies on the horizontal axis, but rather as a small bar that stands above the x-axis by exactly 10

pixels. To find the largest number, the variable MAX is originally set to the value -INF (actually, -1.7E+38, a value very close to the smallest number that can be represented in floating-point variables). This ensures that any usable number will be larger than the original MAX. In line 80 every S(1) is compared with the current maximum, and at the end of the loop (lines 70 through 110), the largest value in S will be in MAX. Similarly, the variable MIN is initialized with the value + INF, and at the

```
8 '** Program 1 **
 10 INF=1.7E+38
                        'Infinity
 28 SCREEN 1:CLS 'Set graphics mode
38 INPUT Number of bars ;N:IF N<2 THEN 38
48 DIN S(N) 'Set space for N valuas
58 MAX-INF 'Set maximum to minus infinity
 68 MINEINE
                     'Set minimum to infinity
 70 FOR I=1 TO N
        INPUT Bar value";S(I)
        IF S(I) > MAX THEN MAX=S(I)
        IF S(I) (MIN THEN MIN=S(I)
    NEXT
120
    IF MIN-MAX THEN PRINT"All the numbers era the same. ": END
138 CLS
148 LINE(8,8)-(8,199)
                                     'V-avie
                                     'X-axis
150 LINE (0,199) - (319,199)
168 DX=328/N
                            Width of one column
178 WB=DX*.8
188 SPB=DX*.5-(WB*.5)
                            'Width of one bar
'Starting point of first bar
IN) 'Scaling fector
198 FACTOR=198/(MAX-MIN)
288 FOR I=1 TO N
21 6
        HEIGHT= (S(I)-MIN) *FACTOR 'Height of bar
228
        LINE (SPB, 198-HEIGHT) - (SPB+WB, 198) , 2, BF
```

Program 1: A BASIC program to create a simple bar chart.

258 NEXT

268 W\$=INPUT\$(1)

238 'Draw chart

288 WB-WC*.8

290 MWT-WB\8

318 CC=SPB+WB\2 328 Hw-BH-TH+1

240 SCREEN 1:CLS

278 WC=(RM-LM+1)/N

338 HVP=INT(HW*.95)

250 LINE (LH, TM) - (LM, BM) 268 LINE (LH, BH) - (RM, BM)

300 SPB=LM+WC*.5-(WB*.5)

348 FACTOR-HVP/(MAX-MIN)

LINE (SPB, 198-HEIGHT) - (SPB+WB, 198), 3, B SPB-SPB+DX

```
g '*** Program 2 **
                                                                                         'Infinity 'Screen margins
     18 INF=1.7E+38
               LM-48:RH-319:TH-3:BH-198
     30 IF BM>190 THEN CLS:PRINT The bottom margin is too lerge
     JULY SHALLSWING CASEFFLENT The bottom margin is too lerge for "PRINT" the titles to fit. Use a lerger one. "END of "CHING CASEFFLENT" The top margin is too small 18 for small state of the state of the
     80 DIM S(N), T$(N)
                                                                                                    'Sat space for N values and titles
     98 DIM H(208) ,N(288)
                                                                                                    'Temporery erreys for GET and PUT
 100 MAX -- INF
                                                                                                 'Sat maximum to minus infinity
110 MIN-INF
120 FOR I=1 TO N
                                                                                                   'Set minimum to infinity
                          INPUT"Title, Velua ";T$(I),S(I)
IF S(I)>MAX THEN MAX=S(I)
IF S(I)<MIN THEN MIN=S(I)
136
 150
 178 IF MIN-MAX THEN PRINT"All numbers are the same.":END
188 'Find longest value
108 LNG1-LEN(STR$((NT(MAX))):IF MAX>=8 THEN LNG1-LNG1-1
288 LNG2-LEN(STR$((NT(MIN))):IF MIN>=8 THEN LNG2-LNG2-1
218 IF LNG1)-LNG2 THEN MAXLEN-LNG1 ELSE MAXLEN-LNG2 'F
                          langth of longast velue
                IF MAXLEN*8+2>LM THEN CLS:PRINT"The left margin is too small
                          for the :PRINT values to fit. Use e larger one. ":END
```

'Y-exis

'X-axis

'Width of one column

'Maximum width of titles

'Maximum verticel point 'Scaling fector for bars

'Starting point of first bar 'Center of first column 'Haight of window

'Width of one bar

end of the loop, the smallest value that is | Program 2: This program allows you to insert titles and values on the chart axes.

(Program I ends)

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```
350 D=MAX-NIN
                                  'Distance between MIN and MAX
360 FV=1/(NV-1)
                                  'Factor to scale values
370 DY=NVP/(NV-1)
                                  'Vertical dietance between value
388 PY=TH+MVP-3:PX=LM-2-MAXLEN*8
398 'Put values in vertical sxis
                                          'Position of valuee
488 FOR I=8 TO NV-1
       T=INT (D*FV*I+NIN)
                                  'Value for Y sxie
       LOCATE 1,1:PRINT USING STRINGS(MAXLEN,**);T;
GET(8,8)-(MAXLEN*8-1,7),H 'Copy value in graphice form
438
       LOCATE 1,1: PRINT SPACE$ (MAXLEN);
440
458
       DH=PY+3
       PUT(PX, PY), M, PSET
FOR J=LM TO RM STEP 3 'Dotted line
469
478
488
         PSET (J, DH)
       NEXT
490
       PY-PY-DY 'Set vertical position for next value
510 NEXT
528 GET(8,8)-(288,7),N 'Copy top-left part of ecreen
538 'Put titles in horizontal sxie
548 FOR I=1 TO N
558 LOCATE 1,1:T$=LEFT$(T$(I),MMT):PRINT T$;"
568
       LT-LEN(T$)*8 'Length of titls, in pixels
GET(0,0)-(LT,7),M 'Copy titls in graphics form
PUT(CC-LT\2,BM+2),M 'Put title in its place
578
588
       CCHCCAMC
598
600 NEXT
618 LOCATE 1,1: PRINT SPACE$ (28);
                                           'Erase last title
628 PUT (0,0), N, PSET
                                           'Restors axie and value
     Draw bars
638
648 FOR I=1 TO N
      BEIGHT=(S(I)-MIN) *FACTOR 'Height of bar
658
       LINE (SPB, MVP-HEIGHT+TM) - (SPB+WB, BM), 2, BE
660
678
       LINE (SPB, MVP-BEIGBT+TM) - (SPB+WB, BM), 3, B
      SPR-SPRANC
                        'Set position of next bar
690 NEXT
```

```
786 WS-TWD0000/11
                                                                                                                                                                                                                            (Program 2 ends)
         # *** Double bar chart: Program 3 **
                                                                                     Infinity
    10 INF=1.7E+38
    28 LM-58:RM-258:TM-38:BM-148
                                                                                                                            'Screen margins
    30 IF BM>190 THEN CLS:PRINT*The bottom margin is too large
   for 'PRINT'the titlee to fit. Use a larger ons. TEMD 48 IF TRXG TRUE CLIFFRENT The top margin is too small of IF TRXG TRUE CLIFFRENT The titles to fit. Use a larger ons. TEMD 48 IF TRXG TRUE CLIFF OF TRUE CLIFF O
                        for":PRINT"the titlee to fit. Ues a larger ons.":END
                                                                                              'Temporary arraye for GET and PUT
'Set maximum to minus infinity
    98 DIM M(288) , N(288)
 188 MAXU-THE
 118 MIN-INE
                                                                                              'Set minimum to infinity
 128 FOR I=1 TO N
                        INPUT Title ";T$(I)
 130
                        FOR J=1 TO 2
PRINT J:
 148
 158
 168
                                  INPUT"Value ";S(I,J)
                                IF S(I,J) > MAX THEN MAX=S(I,J)
IF S(I,J) < MIN THEN MIN=S(I,J)
 188
 198
                      NEXT
 288 NEXT
 218 IF MAX-MIN THEN PRINT"All numbers are the same. ": END
228 'Find longeat valus
238 LNG1=LEN(STR$(INT(MAX))):IF MAX>=8 THEN LNG1=LNG1-1
 248 LNG2=LEN(STR$(INT(MIN))):IF MIN>=8 THEN LNG2=LNG2-1
258 IP LNG1>LNG2 THEN MAXLEN-LNG1 ELSE MAXLEN=LNG2 'Find
```

actually entered will be in MIN.

The axes are drawn in lines 140 and 150. The width of the screen is 320, and there are N numbers to be plotted; therefore, the screen should be thought of as divided into N columns, each one with room for one bar. The width of every column is DX=320N. The horizontal center of the first column is at the point DX=5.50 that



A sample chart produced with Program 2.

adjacent bars do not touch, they should not have the same width as the columns, but rather, a fraction of it. In Program 1 they are 8/10 of one column, that is, 1.5×0.5 Ke with $1.5 \times 0.5 \times 0.5$ Ke with $1.5 \times 0.5 \times 0.5$ Ke with $1.5 \times 0.5 \times 0.5$ Ke with of one bar). Supposing CC to be the horizontal center of the leftmost column (DX*0.5), the vertical walls of the first bar as at CC—(WB/2.2) and CC+(WB/2.1) line 180 the variable SP9 (suring point of the SP9) sette the horizontal coordinate of the wind set of the SP9 (SP). The SP9 of SP1 is the SP1 i

Program 2: Scaling the Entire Chart

The second program adds a number of refinements to the simple program between the refinements of the simple program at the size of the entire chart can be modified. In addition, were but is identified with a title, and the horizontal axis incorporates as et of horizontal axis incorporates as et of the barr. While the smallest quantity displayed could be a negative number in Program 1, in the absence of a scale, there are now up to know that this was the case. Program 2 rectifies this deficiency.

The four variables that determine the left, right, top, and bottom margins of the graph are initialized in line 20. A change in any of these values will automatically be accompanied by an adjustment in the size

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THE RESULTS ARE IN We found the printer which has all the we found the printer which has all the features anyone could want. We've named it the Aprotek Daisy 1120, a real heavy-duty workhorse printing at 20 characters per second. The manufacturer is Olympic Co. Ltd., a highly respected

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This printer has it all. To start with, it has a front control panel with indicators for Pitch Selection which allows for 10, for Picts Schedin which allows for 10.

22. or 15 chandres per inch (PD) or Proportional Spacing. There is a Sched (White) what to which indicated and a pro-of-Form or Form Feed with the board of the TOF button. Other front panel indicates include Prover and Alternative or Form Feed with the board of the TOF button. Other front panel indicates include Prover and Alternative and indicates include Prover and Alternative and in the poper had been to the schedule of the paper feed automatically to a 1 time to purp feed automatically to a 1 time to 10 time to 1

2K buffer allows a page or two of con-current printing and use of your com-puter for the next job. To really take advantage of your printer's optional features, the automatic Cut Sheet Feeder eliminates tiresome paper handling. Also available is the adjustable Tractor Feed ion. Com pare our option t Best of all the Daisy 1120 is quiet:

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of typeface styles are available at most computer or stationary stores. You can pop in a 10, 12, 15 pitch or proportional All 15 CPl you can print 165 columns—a must for spreadsheets.

The Daisy 1120 uses the Diablo Hype III* standard ribbon cartralges. Not only is the bardware completely compatible, the control code recognized by the Daisy 1120 are Diablo (SQI* compatible (industry standard, You can of word property compatible industry standard, You can of word processing packages like new of word packages like new of word processing packages like new of word processing packages like new of word packages like new of wo

take advantage of all the great features of word processing packages like Wondstar* pits: Write*. Microsoft Wond* and most others. This allows you to automatically use superscripts, to automatically use superscripts, to automatically use superscripts, the superscripts of the superscripts. The printer has a set of rear switches which allow the use of standard ASCII as well as foreign character printwheets. The printer has a set of rear switches and the superscripts which allow the use of standard ASCII as well as foreign character printwheets. The page length; can be set to 8, 11, 12, or 15. The Daisy 1120 can also be switched to add automatic line feed if repair the feed of the superscripts.

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CIRCLE 104 ON READER SERVICE CARD

of the entire chart. The variable NV is set for the number of divisions in the vertical axis. If this value is 2, only the minimum and the maximum numbers will be displayed; if it is 3, a third value (the average of the maximum and minimum) will appear between the top and bottom margins. NV may be any number greater than 2, but if too many divisions are used, the numbers in the vertical axis will overlap. The array T\$ stores the titles that correspond to each bar. In lines 170 through 210, the lengths (number of characters) in the maximum and minimum titles are compared, and the length of the longest is stored in MAXLEN. This value is checked in order to ensure that there will be enough room between the left margin of the screen and the vertical axis and also to determine the format in which the numbers will be

Characters produced by the PRINT statement can only be placed within character boundaries, that is, in one of the PC's 40 by 25 cells (80 by 25 in high resolution). This would be a problibitive restriction. In Program 2, therefore, each number and title is first printed in the top-left corne of the severen, from whence it is copied in an array with the GET statement. The information in his array can then be treated as pure image data (not text) and so can be placed exactly where it is needed on the 488 LOCATE 498 DH-PY+3 588 PHT (PX.

518

528

538 NEXT

818 NEXT

838 WS-THRITTS (1)

50 SCREEN 0:WIDTH 80:CLS

PUT (PX, PY) , N, PSET

PSET (J, DH)

FOR J-LM TO RM STEP 3

screen To find the vertical position of each number on the vertical scale, the maximum vertical point (MVP, calculated in line 330) is divided into the number of vertical divisions (NV-1) and copied in DY. The first identifying number (at the bottom of the chart) is aligned with the top of the smallest bar, the height of which is TM+MVP (the top margin plus the maximum vertical point). Since characters are seven dots high, the first one is placed three pixels above the level of the smallest bar. The number at the bottom of the scale corresponds to the minimum bar and the top scale value corresponds to the maximum bar. The remaining scale numbers should be proportional to their vertical position. To achieve this, the intermediate numbers are scaled in the same way as are the bars, with a maximum and a minimum (line 410). In Program 2 only the integer

```
length of longeat value
268 IF MALLEN*8422LM THEN CLS:PRINT*The laft margin is too small
for the "PRINT*velues to fit. Usa e lerger one. "IEND
    'Draw chart
288 SCREEN 1:CLS
298 LINE(LM,TM)-(LM,BM)
388 LINE(LM,BM)-(RM,BM)
                                   'Y-axis
                                   'x-axia
318 WC= (RM-LM+1)/N
                                   'Width of one column
328 WB-WC*.8
                                   'Width of one bar
338 MNT-HB\8
                                   'Maximum width of titles
340 SPB=LM+WC*.5-(WB*.5)
                                   Sterting point of first bar
'Canter of first column
'Baight of window
350 CC=SPB+WB\2
368 HH-BH-TH+1
378 MVP=INT (HM*.95)
                                   'Maximum verticel point
'Sceling fector for bar
388 FACTOR-HVP/(MAX-MIN)
                                   'Distance between MIN and MAX
390 D=MAX-MIN
                                   'Factor to scale velues
488 PV=1/(NV-1)
                                   'Vertical distance between velues
418 DY=MVP/(NV-1)
420 PY=TM+MVP-3:PX=LM-2-MAXLEN*8 'Position of values
43E
    'Put values in vertical exia
448 FOR I=8 TO NV-1
458
       T=INT (D*FV*I+MIN)
                                   'Value for Y exis
       LOCATE 1,1:PRINT USING STRING$ (MAXLEN, * **);T;
462
       GET (8.8) - (MAXLEN*8-1,7) ,M
                                          'Copy value in graphica form
476
       LOCATE 1,1:PRINT SPACE$ (MAXLEN);
```

```
548
       PY=PY-DY
                     'Set verticel position for next value
550 NEXT
568 GET(8,8)-(288,7),N 'Copy top-left part of screen
578 'Put titles in horizontel exia
588 FOR I=1 TO N
598 LOCATE 1,1:T$=LEFT$(T$(I),MMT):PRINT T$;"
       LT=LEN(T$)*8 'Length of title, in pixels

GET(#,0)-(LT,7), M 'Copy title in graphics form

PUT(CC-LT\2,8M+2), M 'Put title in its place
618
628
       CC=CC+WC
    NEXT
650 LOCATE 1,1:PRINT SPACES (20);
                                            'Ereae last titla
668 PUT (8,8), N, PSET
                                            'Reatore axia and value
678 FB=WB*.3
                   'Fraction of bar to make them thinner
688 'Draw bara
698 FOR I=1 TO N
```

'Dotted line

```
788
       FOR J-1 TO 2
718
         BEIGHT=(S(I,J)-MIN)*FACTOR 'Beight of bar
ON J GOTO 738,778
728
738
            X1=SPB:Y1=MVP-HEIGHT+TM:X2=SPE+WB-FB:Y2=BM
748
            LINE (X1, Y1) - (X2, Y2) ,1,BF
            LINE(X1,Y1)-(X2,Y2),3,B
768
            GOTO 818
778
            X1=SP8+FB:Y1=MVP-HEIGBT+TM:X2=SP8+WB:Y2=BM
            LINE (X1,Y1) - (X2,Y2),2,BF
LINE (X1,Y1) - (X2,Y2),3,B
788
888
         SPB=SPB+WC
                           'Set position of next bar
```

** Bolid Bar chett: Program 4 **
18 INF-178-18
18 INF-178-18
18 INF-178-18
18 INF-178-18
18 INFO STATE Cheffer to the margin is too lerge
for PRINTT-the Little to fit. Use a larger one. TEND
18 TWO INFO CO. PRINTT-the top margin is too meal!

'Sat graphica mode

part of a number is displayed. If a fraction-

(Program 3 ends)

```
68 INPUT*Number of values in vertical axia ";WV:IF NV<2 THEM 68
78 INPUT*Number of bars ";N:IF N<2 THEM 78
88 DIM S(N),T$(N) 'Set space for N values and titles
98 DIM H(286),N(288) "Temporary arraya for GET and FUT
                                    'Temporary arraya for GET and PUT
                                   'Set maximum to minus infinity
188 MAX -TNP
118 MIN-INF
                                  'Set minimum to infinity
128 FOR I=1 TO N
138
        INPUT Title, Value ":T$(I),S(I)
         IF S(I)>MAX THEN MAX=S(I)
IF S(I)<MIN THEN MIN=S(I)
148
158
168 NEXT
178 IF NIN-MAX THEN PRINT"All numbers are the same.":END
188 'Find longeat value
198 LNG1=LEN(STRS(INT(MAX))):IF MAX>=8 THEN LNG1=LNG1-1
288 LNG2-LEN(STRS(INT(MIN))):IF MIN>=8 THEN LNG2=LNG2-1
218 IF LNG1>LNG2 THEN MAXLEN=LNG1 ELSE MAXLEN=LNG2
        length of longest value
     IF MAXLEN*8+2>LM THEN CLS:PRINT*The left margin is too small
        for the":PRINT"values to fit. Use a larger one.":END
234
     'Draw chart
248 SCREEN 1:CLS
258 WC=(RM-LM+1)/N
                                          'Width of one column
268 WB=WC*.8
                                          'Width of one bar
278 MWT=WB\8
                                          'Maximum width of titles
                                          'Maximum water or titles
'Starting point of first bar
'Center of first column
'Height of window
     SPB=LM+WC*.5-(WB*.5)
288
298 CC=SPB+WB\2
     HW-BM-TM+1
388
318 MVP=INT(HW*.95)
                                          'Maximum vertical point
328 FACTOR=MVP/(MAX-MIN)
                                          'Scaling factor for bara
338
     D-MAX-MIN
                                          'Distance between MIN and MAX
346 FV=1/(NV-1)
                                          'Factor to scale valuea
358 DY=MVP/(NV-1)
                                          'Vertical distance between values
                                                   'Position of valuea
36# PY=TM+HVP-3:PX=LH-2-MAXLEN*8
     'Put titles in horizontal axis
388 FOR I=1 TO N
        UK 1=1 TU N
LOCATE 1,1:TS=LEFTS(TS(1),MMT):PRINT TS;"
LT=LEN(TS)*8 'Length of title, in pixels
GET(8,8)-(LT,7),M 'Copy title in graphics form
PUT(CC-LT/2,BM+2),M 'Put title in its place
398
488
418
428
         CC=CC+WC
438
448 NEXT
     LOCATE 1,1:PRINT SPACES(28);
'Draw bars
                                                   'Ersae laat title
458
478 LINE (LM, TM) - (LM, BM)
                                          'V-avie
488 LINE (LM, BM) - (RM, BM)
498 FOR I=1 TO N
                                          'X-axis
588
         HEIGHT=(S(I)-MIN)*PACTOR 'Height of bar
51.0
         X1=SPB:Y1=MVP-BEIGBT+TM:X2=SPB+WB:Y2=BM
528
         FOR J=8 TO 8 STEP -1
           IF J=8 THEN LINE(X1+J,Y1-J)-(X2+J,Y2-J),2,BF

IF J=8 THEN COL-8 ELSE COL-3

LINE(X1+J,Y1-J)-(X2+J,Y2-J),COL,B

PSET(X2+J,Y1-J)-(X2+J,Y2-J)
538
548
```

'Set position of next bar

'Set vertical position for next value

T=INT(D*FV*1*NIN) 'Value for Y axia LOCATE 1,1:PRINT USING STRING\$(MAXLEN, "*");T;

al part is needed, change the formatting string of the PRINT USING statement to STRINGS(MAXLEN."#") +" "+STRING\$(ND,"#"), where ND is the number of decimal places shown.

To find the maximum length allowed for a title. Program 2 uses the width of a bar (WB). Since characters are eight pixels wide, every column can accommodate at the most WB/8 pixels. Every title is truncated to this maximum length in line 550. printed in text position 1,1, copied in the array M, and then placed in position in line 580. The variable CC (center of column) is



A sample chart produced with Program 3.

initialized with the horizontal component of the center of the first column; the title is centered by dividing the width of the title by two and subtracting the resulting number from CC. Since the center of the next column is exactly DX pixels to the right of the current one, the addition of line 590 leaves CC ready for the next title.

The bars are drawn as they were in Program 1, except that here the values of the left and top margins are added to the components of every bar.

Program 3: Multiple Bars

When two or more values relate to the same variable, representing them with overlapping bars makes their comparison very easy. To compare the monthly data of two years, for example, it is convenient to show the bars of one year overlapping those of the other, so that the two can be easily compared. Program 3 allows you to produce this kind of graphic.

Actually, very few changes are necessary to convert the previous program from single to double bars. First, an extra dimension must be added to the array in which the values are stored. In Program 3

'Copy value in graphica form

568 578

500 NEXT SPB=SPB+WC

508 600 NEXT

648

658

668

67B DH=PY+3

688

698

788

718 NEXT

738 NEXT

628 FOR I=8 638 T=INT

PSET (X1+J, Y1-J) .6

618 'Put valuea in vertical axia R I=# TO NV-1 T=INT(D*PV*I+NIN)

PSET (J, DH)

PY=PY-DY 728

GET (8,8) - (MAXLEN*8-1,7),M

LOCATE 1,1: PRINT SPACES (MAXLEN);

PUT(PX,PY),M,PSET FOR J=LM TO RM STEP 3 'Dotted line

the array S is dimensioned as S(N.2). Since the same title applies to both bars. the array TS need not be changed. The maximum and minimum must be the largest and smallest of both sets of numbers.



A sample chart created with Progrem 4.

The vertical components of each bar are calculated as for single bars, but a small change in the calculation of the horizontal components is required. If the same horizontal components were used for both related bars, the larger would cover the smaller one completely. In Program 3, therefore, the variable FB (fraction of bar) is set to 3/10 the width of the bars. The borizontal components of the first har are XI and X2-FB (resulting in a bar 7/10 the width of those drawn in the previous programs). Similarly, the horizontal components of the second bar are X1+FB and X2-the same width as the first bar, but offset FB units to the right.

If you wish to display more than two overlapping bars, it is necessary to divide the width of one complete bar into the number of values there are for each title and then to use the resulting number as a guide in placing the narrow bars. However, experience shows that charts displaying more than three overlapping bars are often more confusing than illuminating.

Program 4: Solidifying the Bars One of the most popular ways to display data is with charts using solid (threedimensional) bars. Bars of this type can be produced with Program 4.

In Program 4 solid bars are created simply by drawing each bar several times while gradually changing its horizontal and vertical coordinates. The rectangles that make the sides of the bar are drawn with color 3 (white) in line 550. The care | Program 5: This program segments and stacks bars vertically.

```
8 '** Stacked bara: Program 5 **
8 INF=1.7E+38 'Infinity
     18 INF=1.7E+38
     20 LM=40:RM=319:TM=10:BM=190
                                                                                                                    'Screen margine
    28 LM-48:RM-3.9:ITM-18:RM-19* Screen margine
39:IF BN-39 TiERE CLS:PRINT*The bottom margin ie too large
for :PRINT*the titlea to fit. Use e lerger one.*:ERD
40:IF TK-3 TIERE CLS:PRINT*The top margin ie too menl
for :PRINT*the titlee to fit. Use e lerger one.*:END
55 SCREEN SINDIN 89:CLS:
55 SCREEN SINDIN 89:CLS
55 SCREEN SINDIN 89:CLS
55 SCREEN SINDIN 89:CLS
55 SCREEN SINDIN 89:CLS
56 SCREEN SINDIN 89:CLS
57 SCREEN SINDIN 89:CLS
58 SC
             INFUT*Number of bare ",N:IF N<2 THEN 68
INFUT*Number of levele ",N:IF NL:I THEN 78
INFUT*Number of levele ",N:I THEN 78
INFUT
     88 DIM S(N, NL) ,T$(N) ,T(N)
                       and totale
     98 DIM M(288),N(288)
                                                                                           Temporery arrays for GET and PUT
 100 MAX=-INF
                                                                                      'Set maximum to minue infinity
'Set minimum to zero for etecked bare
 128 FOR I=1 TO N
138 PRINT I;
148 INPUT"Title ";T$(I)
  150
                       FOR J=1 TO NL
PRINT "Level ";J;
                               INPUT S(1,J)
 1 88
                               IF S(I, J) < # THEN PRINT* < # Illegal in Stacked bara.
                                      Repeet. GOTO 168
                               T(I)=T(I)+S(I,J)
 200
                       NEXT
                       IF T(I)>MAX THEN MAX=T(I)
 228 NEXT
238 "Find longest velue
248 MAXLEN-LEN(STRS(INT(MAX))):IF MAX>=8 THEN MAXLEN-MAXLEN-1
258 IF MAXLEN*642-240 THEN CLS:PRINT*The left margin is too small
                       for the :PRINT value to fit. Use a larger one. :END
 268
                'Draw chart
 278 SCREEN 1:CLS
 280
                                                                                                           'Y-exia
              LINE (LM, TM) - (LM, BM)
 298 LINE(LM, BM) - (RM, BM)
388 WC= (RM-LM+1)/N
                                                                                                          'X-axie
                                                                                                             Width of one column
 318 WB-WC*.8
                                                                                                             Width of one bar
 328 MUTHUM\6
                                                                                                           'Maximum width of titlee
                                                                                                           'Starting point of first bar
'Center of first column
  338 SPB=LM+WC*.5-(WB*.5)
  348 CC=SPB+WB\2
                                                                                                           'Height of window
'Maximum vertical point
'Scaling factor for bare
  358 BW=BM-TM+1
  368 MVP-INT (HW*.95)
 378 FACTOR-HVP/(HAX-MIN)
                                                                                                             Distance between MIN and MAX
 380 D=MAX-MIN
 398 FV=1/(NV-1)
                                                                                                           'Pactor to acale veluee
 488 DY-MVP/(NV-1)
                                                                                                           'Vertical dietance between velues
 418 PY=TM+HVP-3:PX=LM-2-MAXLEN*8
                                                                                                                                'Position of velues
              'Put values in vertical axis
 428
 438 FOR I=LN+2 TO RM STEP 3:PSET(1,8):NEXT
             GET (LH+2,8) - (RM,8), N:CLS 'DO 'Y-exie
                                                                                                                         'Dotted line
 458 LINE (LH, TH) - (LM, BM)
                                                                                                          'X-axie
 468 LINE (LM, BM) - (RM, BM)
 478 P$=STRINGS(MAXLEN, ***)
 488 MA-MAY-MYN
 498 'Normelize numbers and find number of zeroe
 588 IF MA<1 THEN 548
 518 WHILE INT(MA)>=18:MA=MA/18:R=R+1:WEND:B=MA
528 IF R=8 THEN F$=F$+*.** 'At least one dec
                                                                                                             'At least one decimal in the format
 538 GOTO 568
548 WHILE INT(MA)<1:MA=MA*18:R=R-1:WEND:B=MA+.881
```

point 568 IF B>=1.2 THEN 588 ELSE R=R-1:ST=18:IF R<=-2 THEN PS=FS+*6*

588 IF B>=5 THEN 618 ELSE ST=5 'Since atep ie 8.5, add
598 IF INSTR(F\$,".")<>8 THEN F\$=F\$+"*" 'one decimal to formet

628 MAXLEN=LEN(F\$) 'F\$ is the format 638 IF MAXLEN*8+2>LM THEN CLS:PRINT"The left margin ie too small

'R xeroe efter the decimal

'Since atep ie 8.5, add

55# F\$-F\$+"."+STRING\$(ABS(R),"4")

578 GOTO 628

688 GOTO 628

```
for the":PRINT"values to fit. Use s larger value.":END
648 'Print values
659 EX=18 (R-1)
668 A=MIN/(ST*EX)
678 IF A<>INT(A)THEN A=INT(A)+1 ELSE A=INT(A)
688 HHILE A*ST*EX-MAX < .088881
       T=A*ST*EX
       Y-MVP+TH-(T-MIN)*FACTOR
       LINE (LM-1, Y) - (LM+2, Y)
718
728
        PUT(LM+2,Y),N
730
       GET(8,8)-(MAXLEN*8-1,7),M 'Copy value in graphica form
748
       LOCATE 1,1:PRINT SPACES (MAXLEN);
PUT (LM-MAXLEN*8-2,Y-3),M.PSET
750
778
789 WEND
798 GET(0,0)-(208,7),N 'Copy top-left part of screen
800 'Put titles in horizontal sxis
818 FOR I=1 TO N
       LOCATE 1,1:TS=LEFTS(TS(I),MMT):PRINT TS;*
820
838
       LT=LEN(T$)*8 'Length of title, in pixels
GET(0,8)-(LT,7),M 'Copy title in graphica form
848
858
       PUT(CC-LT\2, BM+2),M
                                      'Put title in its place
868
       CC=CC+WC
878 NEXT
888 LOCATE 1.1: PRINT SPACE$ (28);
                                            'Erage last title
898 PUT(8,8),N,PSET
                                            'Restore axis and value
988 'Draw bars
918 FOR I=1 TO N
928 T=8
       X1=SPB: X2=SPB+WB: Y2=BM
938
        COL=2
                       'Color for first stacked bar
948
        FOR J=1 TO NL
958
968
          T=T+S(T.J)
978
          HEIGHT (T-NIN) *FACTOR
                                          'Height of bar
          Y1=MVP+TM-HEIGHT
          LINE(X1,Y1)-(X2,Y2),COL,BF
LINE(X1,Y1)-(X2,Y2),3,B
998
 1008
1810
           Y2=Y1:COL=COL+1:IF COL=4 THEN COL=8
1828
         NEYT
1838
        SPB=SPB+WC
                          'Set position of next bar
1848 NEXT
                                                                    (Program 5 ends)
1858 WS=INPUTS(1)
```

```
8 '** High resolution atacked bara: Program 6 **
18 INF=1.78+38 'Infinity
28 LM=48.RH=635:TM-5:HM-198 'Screen margins
38 IF BM>198 THEN CLS:PRINT*The bottom margin is too large
          for "IPRINT the titles to fit. Use a larger one. "END of "IPRINT the titles to fit. Use a larger one." END of the for "IPRINT the titles to fit. Use a larger one. "END of "IPRINT the titles to fit. Use a larger one." END
      IF
 50 'Read patterns
60 READ NP 'Number of patterns
 78 DIM PS(NP)
 88 FOR I=1 TO NP
98 FOR J=1 TO 8
162
              7=0
116
              FOR K=1 TO 8
                  READ C:T=T+C*2"(8-K)
128
130
               NEXT
               P$(I)=P$(I)+CHR$(T)
          NEXT
160 NEXT
178 SCREEN 8:WIDTH 88:CLS
                                                             'Set text mode
180 INPUT Number of bara ":N:IF N<2 THEN 180
190 INPUT Number of levela ":NL:IF NL<1 THEN 190
200 DIM S(N, NL),TS(N),T(N)
                                                           'Set space for N values, titles
```

Program 6: This program can flood a bar chart with black-and-white patterns to differentiate one segment from another.

taken to erase the two top comers with black dots in lines 560 and 570 contributes greatly to the feeling of depth. The last bar is drawn with color 2 (when J=0 in line 530) to produce the front wall, and the frame is traced with black. Since the bars that correspond to the height of the horizontal dotted lines are the last to be drawn, the scale numbers and the dotted lines are added after all the bars have been finished

Program 5: Stacked Bars

Instead of displaying several sets of data with overlapping bars (as in Program 3), greater clarity can sometimes be achieved by stacking one on top of the other. Program 5 gives you the means to achieve this. The screen shot illustrating Program 5 clearly shows that the largest of all the sets is represented with the darkest

Since it is the actual magnitude of each number that is compared in this type of graph, it makes little sense to allow negative numbers. The minimum must be zero, and the maximum must be the number that corresponds to the largest complete bar. NL is the number of partial bars (segments) that make up a complete bar, so that the numbers represented in the first bar are S(1.1), S(1.2), S(1.NL), To calculate the vertical coordinates of the first partial bar, the number S(1,1) is added to T (which originally contains zero). After the height is computed, Y1 is calculated in line 980. Y2, the bottom of the first partial bar, is equal to the bottom margin (BM). The bottom of the second segment of each bar coincides with the top of the first, so the value of Y1 is copied in Y2 (line 1010). The height of the second bar segment is calculated with T. which now contains S(1,1)+S(1,2). The process is repeated for the remaining segments of the bars, with T always containing the sum of the previous numbers in the same bar.

You will notice, in the screen shot for Program 5, that the number scale along the vertical axis is not the same as in the previous charts. Instead of printing the largest number at the top and the smallest at the bottom, here the values are guides that do not show the exact values of the minimum and maximum but that give a very good idea of the relative magnitude of every bar. If the minimum is 0 and the maximum

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210, for example, instead of printing 0 and 210 at the extremes, with 105 in the middle (and further fractions of these numbers when more divisions are specified), the program simply displays the numbers 0, 50, 100, 150, and 200. To accomplish this, in Program 5 the largest number is normalized; that is, it is repeatedly multiplied (divided if the number is smaller than 1) by 10 until the integer part of the resulting number is between 0 and 10 (excluded). If the resulting number is between 1.2 and 5 (excluded), the numbers in the vertical axis are printed in steps of 0.5 × 1 followed by the number of digits in the adjusted maximum (maximum - minimum). Thus, in the example above, the largest number is 210, which is 2.1 normalized. The step, therefore, is 0.5×100 , that is. 50. Similarly, if the normalized number lies between 5 and 12 (excluded), the step



A sample chart created with Program 5.

will be 10.

In Program 5 the minimum is always zero; however, the routine that places the numbers along the vertical axis works equally well with negative and very small numbers. When the distance between the minimum and the maximum is smaller than 0.000001, the number at the end of the expression in line 680 must be adjusted accordingly.

Program 6: Flooding with Patterns

Program 5 used alternating colors to differentiate bar segments. This works perfectly on a color screen, but a different method must be used when the charts are printed or displayed in black and white. In Program 6 the chart is shown in high resolution (black and white). Since the size of the figure is controlled by the four variables that determine the margins

...

```
and totals
218 DIN H(288),N(288)
                             'Temporary arreys for GET and PUT
228 MAX=-INP
                             'Set maximum to minus infinity
                            'Set minimum to zero for stecked bare
248 FOR I=1 TO N
250
       PRINT I:
       INPUTTIELA ":TS(I)
268
       FOR J-1 TO NL
270
288
                      :3:
298
388
         THRIP S(T.J)
         IF S(I,J) OF THEN PRINT" O illegel in stacked bare.
            Repeat ":GOTO 288
318
328
         T(I)=T(I)+S(I,J)
       NEXT
33.0
       IF T(I)>MAX TEEN MAX=T(I)
348 NEXT
350 'Find longest value
368 MAXLEN-LEN(STRS(MAX)): IF MAX>=0 THEN MAXLEN-MAXLEN-1
370 'Drew chert
388 SCREEN 2:CLS
                                  'Y-exic
398 LINE (LM, TM) - (LM, BM)
                                  'X-exie
488 LINE (LM, BM) - (RM, BM)
418 WC=(RH-LH+1)/N
                                  'Width of one column
428 WB=WC*.8
                                  'Width of one bar
438 MYT-NB\8
                                  'Maximum width of titlee
                                  'Starting point of first bar
'Center of first column
448 SPB=LM+WC*.5-(WB*.5)
45# CC=SPB+WB\2
                                  Beight of window
460 BN-BH-TH+1
478 MVP=INT (HN *. 95)
                                  'Maximum vertical point
488 PACTOR-MVP/(MAX-MIN)
                                  'Scaling factor for bers
498 D-MAX-MIN
                                  'Dietence between MIN end MAX
500 FV=1/(NV-1)
                                  'Factor to scele velues
518 DY=MVP/(NV-1)
                                  'Vertical distence between values
528 PY=TH+NVP-3:PX=LM-2-MAXLEN*8
538 'Put velues in verticel exis
                                         'Position of values
548 FOR I=LM+2 TO RM STEP 3:PSET(I,8):NEXT
558 GET(LM+2,8)-(RM,8),N:CLS
                                       Dotted line
                                  'Y-exie
560 LINE (LM, TM) - (LM, BM)
570 LINE (LM, BM) - (RM, BM)
                                  'X-exie
580 F$-STRING$ (MAXLEN, "6")
508 MARHAY-MIN
    'Normaliza numbers and find number of zeros
618 IF MA<1 THEN 658
628 HILE INT(MA)>=18:MA=MA/18:R=R+1:WEND:B=MA
638 IF R=8 THEN F$=F$+".8" 'At lacet one dads
                                  'At lacet one decimal in the formet
648 GOTO 678
658 WEILE INT (MA) <1: MA=MA*18:R=R-1:WEND:B=MA+.881
668 F$=F$+*."+STRIMG$(ABS(R),"*) 'R zeros afte
                                            'R zeros after the decimel
       point
678 IF B>=1.2 THEN 698 ELSE R-R-1:ST-18:IF R<=-2 THEN FS-FS+"4"
689 GOTO 738
696 IF B>=5 THEM 728 ELSE ST=5 'Since stap is 8.5, edd
788 IF INSTR(F$,*,*) OF THEM F$=F$+*8" 'one decimal to formet
                                                 'Since stap is 8.5, edd
718 GOTO 738
728 ST-18
738 MAXLEN-LEN(FS) 'PS is the format
748 IT MAXLEN-8+2>LM THEM CLS:PRINT'The left margin is too small
for the "FRINT' values to fit. Use e larger value.":END
758 'Print values
768 Ex=18"(R-1)
778 A-MIN/(ST*EX)
                                           'Find bottom number
788 IF AOINT (A) THEN A-INT (A) +1 ELSE A-INT (A)
798 WHILE A*ST*EX-MAX < .000001
888
       T-A*ST*EX
                                           'Number on axie
818
       Y=NVP+TH-(T-HIN)*FACTOR
LINE(LM-1,Y)-(LM+2,Y)
                                           Scaled height of number
828
                                           Line in varticel exis
838
       PUT(LM+2,Y),N
                                            Put dotted line
848
858
       LOCATE 1,1:PRINT USING P$:T: 'Print number
                                           'Copy in grephics form
       GET(8,8)-(MAXLEN-9-1,//)
LOCATE 1,1:PRINT SPACES(MAXLEN); 'Erese number
'Put number in its plece
264
676
```

'Increment for next number

```
898 WEND
988 CET (8,8)-(288,7) ,N
                                           'Copy top-left part of screen
918 'Put titles in horizontal axis
928 FOR I=1 TO N
938
       LOCATE 1,1:TS=LEFTS(T$(I),MWT):PRINT TS; " "
948
       LT-LEN (T$) *8
                                            Length of title, in pixels
       GET (8,8) - (LT,7) , M
PUT (CC-LT\2,8M+2) , M
                                           'Copy title in graphics form
958
968
                                           'Put title in its
978
       CC=CC+WC
988 NEXT
990 LOCATE 1,1:PRINT SPACES (28):
                                           'Erase last title
1888 PUT(8,8),N,PSET
1818 'Draw bars
                                           'Restore axis and value
1828 FOR I=1 TO N
        X1-SPB: X2-SPB+WB: Y2-BM
1450
        DAT-1
                       'Pattern for first stacked bar
        FOR J=1 TO NL
1868
1878
           T=T+S(I,J)
1888
           HEIGHT- (T-MIN) *FACTOR
                                          'Beight of bar
1898
           Y1=MVP+TM-HEIGHT
1100
           LINE (X1,Y1) - (X2,Y2),0,BF
LINE (X1,Y1) - (X2,Y2),1,B
1110
           IF X2-X1>2 THEN PAINT (X1+2,Y1+1),P$(PAT),1
1120
1130
           ¥2-¥1
1140
           PAT=PAT+1:IF PAT>NP THEN PAT=1
1158
        NEXT
        SPB=SPB+WC
                          'Set position of next bar
1168
1170 NEXT
1178 NEXT
1188 W$=INPUT$(1)
'Number of patterns
      'Pirst Pattern
2828 DATA 1,8,8,8,1,8,8,8
2838 DATA 8,8,8,8,8,8,8,8
2848 DATA 8,8,1,8,8,8,1,8
2878 DATA 8,8,8,8,8,8,8,8,8
2888 DATA 8,8,1,8,8,8,1,8
2898 DATA 8,8,8,8,8,8,8,8
      Second Pattern
2188 'Second Pattern
2118 DATA 1,8,8,8,8,8,8,8,8
2120 DATA 0,1,8,8,8,8,8,8,8
2136 DATA 0,0,1,0,0,0,0,0
2146 DATA 0,0,0,1,0,0,0
2156 DATA 0,0,0,1,0,0,0
2168 DATA 8,8,8,8,8,1,8,8
2170 DATA 0,0,0,0,0,8,1,0
2180 DATA 0,0,0,0,0,0,0,0,1
2198 'Third pattern
2288 DATA 8,1,1,1,8,1,1,1
2218 DATA 1,1,1,1,1,1,1,1
2220 DATA 1,1,0,1,1,1,0,1
2238 DATA 1,1,1,1,1,1,1,1
2248 DATA 8,1,1,1,8,1,1,1
2250 DATA 1,1,1,1,1,1,1,1,2
2260 DATA 1,1,0,1,1,1,0,1
2278 DATA 1,1,1,1,1,1,1,1
2288 'Fourth pattern
2298 DATA 1,6,8,8,8,8,8,8,1,1,8
2318 DATA 8,8,8,1,1,8,8,8
2328 DATA 8,1,1,8,8,8,8,8
2338 DATA 1,8,8,8,8,8,8,8,1
2340 DATA 8,8,8,8,8,1,1,8
```

(LM,RM,TP, and BM), a simple change in the right margin adjusts the graph to the new screen size.

The PAINT statement of version 2.x of BASICA can flood a shape with a given pattern. (While this statement existed in earlier versions, it could only fill with solid



A sample chart created with Pr

colors). The format of this statement is

PAINT(X,Y),CHR\$(N1)+CHR\$(N2)+..

where X,Y determines the point at which the flooding starts, the string CHR\$(N1)+. . defines the pattern, and C determines the bordering color, that is, the color that will halt the flooding. In high resolution the pattern is 8 pixels wide (one byte wide; every bit corresponds to a pixel), by anywhere from 1 to 64 pixels high. In Program 6. I chose to use natterns of exactly 8 × 8 pixels (à la Macintosh). In the DATA statements that begin in line 2000, every pixel is represented by a zero (black) or a one (white). These numbers are converted into the corresponding byte value in line 120, so that the entire I-th pattern is in P\$(I). In medium resolution, the patterns can only be four dots wide, since it takes 2 pixels to represent the four colors available in this mode. The BASIC manual explains this in detail.

After working with these six programs for a while, you'll be able to acquire a "feel" for which format and what modifications will be best for displaying nearly any two-axis data. Keying them in is a chore you can avoid by downloading them from PC's Interactive Reader Service at (212) 696-0360.

Gabriel Cuellar is the author of Graphics Made Easy for the IBM PC.

2350 DATA 0,0,0,1,1,0,0,0

2368 DATA 8,1,1,8,8,8,8,8

Spreadsheet Clinic

Several months ago we ran two editions of Spreadsheet Clinic and were inundated by enthusiastic reader response. This double-length installment marks the return of an ongoing column.

First Macro

Ce11 445

Cell AAS /DWTTFW0**

Cell AAT

Call ass /8M1TEMP**

Cell AAS (edit)s

Call Anti-

Cell 4412 {mdft}{calc}"

Ce11 A413 (down)

Leaving a Hole for a Variable

It's useful to be able to put variables into a macro. The trick is to put a "hole" in the macro, which is filled before the macro executes.

The example shown in Figure 1 involves two simple macros. You could use it as part of a procedure to input monthly data according to a standard format and save the data with the name of the month as the filename.

The first macro prompts for the name of the month and stores the name in cell Cl. After you have entered all the data for that month, you invoke the second macro, which copies the name of the month into the "hole" in cell A3. The macro then does a file save, using the name of the month as the filename.

The key to using variables in macros is to understand that single commands can be spread over several cells. The file save command that starts in cell A2 doesn't end until cell A4. This is what lets you put a variable in cell A3.

Figure 2 is a more complex example, which you might use to adjust all the numbers in a column of figures by multiplying them by a constant. The macro prompts for the constant and the address of the column of figures, and away it goes. The range name routine (cells AA6 through AA8) that stops the macro at the last number in the column is from LeBlond and Cobb's book, Using 1-2-3.

Paul Jepsen

Bloomington, Minnesota

This is one of those tricks that's so handy

ample in User-to-User (PC, Volume 3 Number 18) used this technique but didn't elaborate on the principle.

The macro in Figure 2 could be made even more flexible if there were a third prompt that supplied the operation to be performed on the column of figures (in this case the * in cell AA9). Any of the arithmetic operators would work. There's nothing to stop you from slinging as many variables as you like into your macros.

/XITEMP=0"/RNDTEMP"/MGAA15"

Monday Through Friday

In the March 19 Spreadsheet Clinic (PC. Volume 4 Number 6), Robert Novak outlined a method to make 1-2-3 or Symphony list weekdays only. Although this may smack of "my worksheet is better than your worksheet," there is a much faster way to do it.

Enter the serial number for the first date in cell C3. In cell C4, enter this formula:

+C3+@TF(@MOD(C3.7)=6.3.1)

/x What is the month of this budget? : "CI" Second Marro Ce11 A1 /ec1"A2" Ce11 A2 /fe Ce11 A3 Cell At Figure 1: This procedure creates a slot that can be filled with variable information. Third Racro Ce11 441 /ulwhat is the edjustment? : "AA15" Prompts for value and stores it in cell AAID Call AA2 /xlahet is the column? : "AAA" Prompts for address of column to adjust, stores in AAA Cell 443 (goto) Seria maya-rurger consend Call 444 "Hols" in mecro (will contain cell address)

Finish nove-cursor connend

et leet velus in colum

Nove to next number in column

Edit cell formule and presers to multiply

Chance fortula teto absolute number

"tela" in each ity he filled by enjustment value!

Counting sequence to

etop ed justeens

Finish multiplication

Cell 8816 Coto ALS Floure 2: This macro carries out an arithmetic function with the constant and cell addresses supplied by the user. you wonder how you did without it. An ex-

SPREADSHEET CLINIC

Copy this formula as far down the column as you like. With the date display format, you will get a list of weekday dates, as:

The formula works like this: If the value of @MDICA_71 (the remainder of the serial number in cell C3 divided by 7) is 6, the plained. This means that you must add 3 to the date in cell C3 to get the next date, Monday. If the value of @MDICA_7) is not equal to 6, you just add 1 for the next date, and you would be seried to be supported to the plain of the mext day of the week.

day of the week.

If you are using Symphony, you can also use the @CHOOSE function to print the day of the week, as:

```
04-Apr-85 Thu
05-Apr-85 Fri
08-Apr-85 Mon
09-Apr-85 Tue
```

The following formula, copied as far down

@CHOOSE(@MOD(C3,7),@ERR,
@ERR,"Mon","Tue","Wed",
"Thu","Fri")

Stan Scott New York New York

Yep, that's a much better solution to the problem. And no need to be shy. If your worksheet is better than our worksheet we want to hear about it.

Subdirectory Menus

I've discovered a relatively simple way, using mem marcos, to choose abdirectories from 1-2-3 at the touch of a button. This is a great convenience for hard disk users who keep different 1-2-3 files in different subdirectories. If the file containing the menu macros is called AUTO123-WKS, and the initial macro is 0/touchslash zero), you get a menu of options as soon as you enter 1-2-3.

Figure 3 contains the complete macro, with explanations in column A. The long prompts in lines 31 and 42 have been shortened to fit the page, but they can be as lone as will fit on the second row of the

menu.

from any of six different directories or, in column H, gives youth option of creating a new file for any of those six subdirectories. In either case, the macro changes 1-2-3's default directory according to the menu selection, and you end up with an old file to work with (line 34) or a blank screen in which to create a new one in filine 45).

Since 1-2-3 menus allow no more than eight choices, this macro, in its simplest form, lets you choose from only eight subdirectories. But, if you name the last menu selection "More" you can use it to call up another menu of subdirectories.

> Rick Vosik Omaha, Nebraska

A nice way to start the day.

Labeling the Lines in a Line Chart 1-2-3 line charts usually look something like Figure 4: the lines are distinguished from each other by little squares, pluses, or other symbols at the data points. Not only do the symbols clutter up the graph, but you have to look at the levend at the bot-

tom to figure out which line is which.

The same graph is cleaner and easier to

as you like, will do the job: The first menu lets you retrieve files read if you can get 1-2-3 to make it look 21 MACRO \D -----23 AUTOMATICALLY CALLS UP 24 25 THE MENU CALLED 'MENU' 26 WHICH IS IN RANGE 830 TD H34 28 25 MENU: SHORT PROMPT ------4: Accounting Market inc Personal R111'e New File LONG PROMPT ------EXPLANATION Start a New Fils Root Floory EXPLANATION EXPLANATION **EXPLANATION** 22 FILE DIRECTORY COMMAND -> /FD /FD /FD /FD /FD /FD /xonmersu2" 33 NAME OF CORRESP. DIRECTORY -> C:\bi11 C:\ A:\ C:\accnto C: \market C:\personal ALLOW USER TO RETRIEVE FILE -> "/FR "/FR 34 "/FR */FR */FR 35 FROM DIRECTORY WITH 36 FILE RETRIEVE COMMAND 38 THIS IS MEMU 2 (RANGE 841 TD 645) 20 WHICH IS CALLED BY New File IT'S FOR CREATING NEW FILES 40 SHORT PROMPT -----> Marksting 41 Account fina Persona 1 8111'e LONG PROMPT ------Floory EXPLANATION EXPLANATION **EXPLANATION** EXPLANATION FILE DIRECTORY COMMAND -> /FD /FD /FD /FD /FD /FD . WAME OF CORRESP. DIRECTORY -> C:\b111 C:\ A:\ C:\aconto C:\market C:\personal FRASES WIRESHIET /way /way "/wey "/www -/wey /wey SO USER CAN CREATE HIS OWN

Figure 3: A menu macro that allows the user to choose subdirectories from 1-2-3.

like Figure 5. There's no obvious way to do that, though, because Lotus doesn't let you put text anywhere you like in a graph. The trick is to fool 1-2-3 into thinking that your line labels are data labels

The program lets you label every data point on the graph with a block of text. (The text would replace the pluses and boxes in Figure 4.) In this case, you only want one data label per line. Use the /GOD command to set up two dummy ranges of data labels, as in Figure 6. The data-label range for the Defense Spending data range is in cells B9.. B19 and the one for Transfer

Payments is in cells C9..C19.

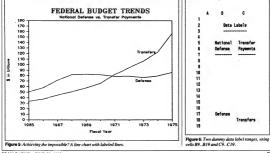
Note that in each range, all but one cell is blank; you want a "data label" for only one data point. Note also that the further down the range column the data label is, the further to the right on the chart the label will appear. You can avoid having the label break the graph line by playing around with its position when 1-2-3 prompts you for the position of the data label. In this case "Transfers" is to the left of the data point for 1974, and "Defense" is under the data point for 1973.

Get rid of the boxes and pluses of Figure 4 with the /GOFGL command, wipe

out the legends at the bottom, and you've | got yourself a snappy-looking Figure 5. Greg Schulte

With all the slick graphics packages now available (see PC Magazine, Volume 4 Number 12), 1-2-3's feeble-looking charts Arlington, Virginia | need all the help they can get.





	A	8	C
1			
3		Data	Labels
3			
4			
5		Mational	Transfer
6		Defense	Payments
1			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17		Defense	
18			Transfers
19			

cells B9. B19 and C9. C19.

wesome advice,

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Embedding Printer Codes in 1-2-3

Worksheets It's possible to print out a 1-2-3 worksheet with different type faces in different places. By breaking the worksheet up into ranges and printing each range sequentially with a different printer setup string, you can have double-width titles, bold-face totals, and so forth. However, printing in chunks is tedious business. Clearly, if you could put the printer codes within the worksheet exactly where you wanted them, you could print the whole worksheet

in one piece. I have written a BASIC program (see Figure 7) that creates a file of printer codes that can be read right into your worksheet. Once you have the codes, you can copy them wherever you like within the worksheet and thus control the printer from any

cell. This program contains control codes for the Epson series of printers, but since it is in BASIC, you can easily rewrite it to suit your own printer. You only need to run it once: It will create a small file called 123PRINT.PRN. Read it into your spreadsheet with the /File Import Numbers command, and you will get something that looks like Figure 8.

The left-hand column contains the control codes, and the right-hand column identifies their functions. To have a single word in your spreadsheet print in italics, copy the italics control codes to the cell where you want italies:

<-4XXX<-5

In this example, - represents the left arrow that appears in the spreadsheet as the "escape" symbol. Then edit that cell, replacing XXX with your text.

Since ←4 turns on italics and ←5 turns it off, only the text sandwiched between them will be italicized. If you want a whole block of text in italics, delete ←5 from the end of the cell. Write your text. Then copy the control codes once again, this time to the point where you want italics to end. and edit out everything but -5.

If you want to use combined print modes, such as emphasized italics or double-strike compressed, you can custom build the proper control codes by using the string of escape (←) symbols that I have string of escapes to the cell where you want | the text, and add characters and delete escapes until it looks like this:

←R←4 TEXT GOES HERE ←5←F

The program also gives you a "compress" symbol followed by a string of escapes, because that symbol, too, is not a regular character. Use that code for combined modes that include compression.

Since the 123PRINT PRN file is so

condensed on, off

'emphasized on, off

'underline on, off

'superscript on, off

'condensed + escapes

'ring bell

'backspace 1 character

'backspace many characters

'double strike on, off

'wide on, off

'italic on, off

```
10 ' Program to create print codes for the Epson series printers
20 '
      to be used in individual cells in Lotus 1-2-3
30 *
```

40 X\$="XXX"

50 ES=CHR\$(27) CTRLO\$=CHR\$(15) : CTRLRS=CHR\$(18) : TWOS=CHRS(2) 60 ZERO\$=CHR\$(0) ONES=CHRS(1) 70 THREE\$=CHR\$(3) : FOURS=CHR\$(4) : FIVES=CHR\$(5) 80 SIX\$=CHR\$(6) SEVENS=CHR\$(7) EIGHT\$=CHR\$(8)

100 ' To use in 123, substitute text for XXX

110 ' + XS + CTRLRS 120 CON\$ = CTRLO\$ 130 MIGES = ES + "M1" + X5 + ES + "M0" 140 EMPH\$ = E\$ + "E" + X\$ + E\$ + "F" 150 DOUBLES = ES + 'G' + X\$ + E\$ + "H" + Yt + Ft + "5"

160 ITALICS = ES + '4' 170 UNOER\$ = E\$ + "-1" + X\$ + E\$ + "-0" 180 SUPER\$ = E\$ + "SO" + X\$ + E\$ + "T" = E\$ + "S1" + X\$ + E\$ + "T"

190 SUB\$ 'subscript on, off 200 FLITES = FS + 'N' + XS + ES + "P" 'elite on, off 210 ESCSS = E\$+E\$+E\$+E\$+E\$+E\$+E\$+E\$+F\$+F\$+F\$ 'escapes

220 COMESCSS = CTRLOS+ES+ES+ES+ES+ES+ES+ES+ES+ES+ES+ES+ES+CTRLRS 230 ' 240 '

250 BACKS = EIGHTS 260 MANYBACKS=EIGHTS+EIGHTS+EIGHTS+EIGHTS+EIGHTS 270 BELLS = SEVENS

280 FILE\$ = "b: 123print.prn" 290 OPEN FILES FOR OUTPUT AS #1

300 WRITE \$1,CON\$, condensed 310 WRITE \$1, WIDE\$, "wide"

320 WRITE \$1.EMPH\$, "emphasized" 330 WRITE \$1.00UBLES. double strike

340 WRITE \$1, ITALIC\$, "italics" 350 WRITE \$1,UNDER\$, "underline"

360 MRITE \$1.SUPER\$, "superscript" 370 MRITE \$1,SUB\$, "subscript"

380 MRITE \$1.ELITE\$, "elite print" 390 MRITE \$1,BACK\$, "backspace"

400 MRITE 81, MANYBACK\$, "several backspaces" STO MRITE ST. BELLS. "DHTT"

420 MRITE \$1.ESCS\$. 'escapes' 430 MRITE \$1.CONESCS\$, "condensed + escapes"

440 CLOSE 450 END

provided. For emphasized italies, copy the Figure 7: A BASIC program that creates the file 123PRINT PRN.

small, you can copy it onto your 1-2-3 master disk and read it into a worksheet whenever you need it.

> Judith R. Epstein Highland Park, Illinois

This is the slickest trick I've seen in a while. And it lets you do a lot more than give your printer a workout. By putting a backspace between two characters, for example, you can overstrike your zeros with backslashes, or combine a Y and an = to make a ven currency symbol.

It's nice to have the beep code, too. Put a few at the end of a big worksheet the next time you decide to print it. So long as you stay within earshot, you can go off and do something else until the printer calls and tells you it's finished printing.

Bug in Subroutine Call

There's a little-known bug in the call-andreturn feature of 1-2-3's programming language. When a keyboard macro contains a subroutine call (/XClocation), 1-2-3 jumps to a new location and begins taking keystrokes from that location until it reaches a subroutine return (/XR), 1-2-3 will then return to the subroutine call, and execution continues from the point immediately after the call.

saved as an absolute storage address. If you call a subroutine that inserts (or deletes) a row (/Worksheet Insert Row or /Worksheet Delete Row) above the call. /-

With one simple macro, 1-2-3 will print every file on vour disk while you do something more exciting.

2-3 fails to adjust the storage address to reflect the addition or subtraction of rows. Thus, when 1-2-3 returns from the subroutine, it returns to the wrong cell, and as the macro continues to execute, it will play back the wrong keystrokes!

I know of only one solution: Put all macros using subroutine calls above any data areas where you will be inserting and deleting lines. This means all your databases must be near the bottom of the worksheet, not near the top. This is an ugly fix, but at least you can use the Auto-Execute macro (\0) to put the cursor at the top of the data area when you load the worksheet. Edward Nisley

Poughkeepsie, New York

Ouch! It's not hard to imagine the frustra-Unfortunately, the location of the call is tion that led to this discovery. Never hav-

ing written a macro that inserted or deleted lines. I tried it out with simple GOTOs as well as subroutine calls. You get the same problem both ways.

Does anybody out there know more about this problem? Any fixes?

Printing all the files on a disk is a monotonous chore. But with one simple macro. 1-2-3 will print every file on your disk while you go away and do something more exciting. The trick is to put this little macro in each file on the disk:

Continuous Printing of Files

/ppagpq ; print file and realignpaper

/fe y; delete file you just printed

/fr : retrieve next file

The next time you need to print out all the files, go through them and change the name of this macro to \0 so that it autoexecutes. (You might give it a different name in the first file just to maintain some control.) Since this series of macros will eventually leave you with a blank disk, copy all your data files to a new disk. Then invoke the macro on the first file and take a coffee break while the files print out unattended.

Aditya M. Sharma Missisauga, Ontario Canada

I racked my brains trying to think of an easy way to get rid of line 2 of the macro that erases the file just printed. Without that step you wouldn't have to copy the files every time you wanted to print, but it does quarantee that you will retrieve and print every file on the disk in sequence.

The only thing I could think of was to replace lines 2 and 3 with (fr{right} " in the second file, |fr{right}{right} in the third file, and so on, but that may be more trouble than it's worth.

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User-to-User

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DOS Phone Utility

The DIAL BAT batch file in Figure 1 is a simple telephone dialer-with its own built-in directory-that uses features of the Haves Smartmodem and the output redirection capabilities of DOS. DIAL.BAT will automatically dial the phone (with a 1200 baud modem), disconnect the modem, and allow you to continue the call. In addition, it lets you set up an extensive dialing directory by expanding the conditional tests for names within the program. You'll need to have the DOS program MODE.COM on the same diskette as the dialer program or in a directory specified by PATH if you use a hard disk.

To use the program, just type:

DIAL number

(then hit Enter) where "number" is either the telephone number you wish to dial or the name of someone in the program's directory. Lift the handset, listen to the speaker in the modem to determine when the dialing is done, and then press any key to disconnect the modern and reconnect the handset. Complete your call as usual.

MODE ensures that the right COM port is set to the proper baud rate. If you're using COM2 or a different baud rate, change the values in the program accordingly. MODE usually prints a message to the screen; DIAL.BAT gets rid of this by redirecting it to the NUL device. The "echo." line helps format the display; if you prefer a blank line, substitute spaces for the period. Just be sure that there are at least two spaces after the ECHO command.

I have successfully used this program with the Hayes I200 and I200B Smartmodems. I expect that other modems that emulate Haves commands will work with DIAL, BAT, DIAL, BAT could also be modified to transmit other autodialer commands for use with non-Haves-compatible

modems. When using other modems, be sure the RS-232-C lines CTS (clear to send) and DSR (data set ready) from the modern are on, or else a DOS error will result. I was unable to use DIAL.BAT with a RIXON R212A Intelligent Modem because of this. Although RIXON modem options can be set for DSR and CTS on. the lines are apparently disabled until the "wake-up" signal to the modem is sent. DOS, however, aborts the transmission to the modern before it sends any characters at all since the modern does not appear to be ready.

R. Frazier Petaluma, California

While this obviously doesn't do everything a full-blown communications program can, it stores names and numbers and dials them adroitly. This is a spiffy use of some of the smarter features of DOS and Haves modems.

a little enhancement.

Better Stripper Since I believe that negative numbers occur just as often as positive numbers. I believe that "My Favorite Stripper" (PC Magazine, Volume 4 Number 5) could use

First, add the little-used SGN() function, which returns a -1 if the number is negative and a + 1 if the number is positive (see Figure 2). This will work for all positive and negative numbers, but not zero. However, we can check to see if the number is zero, within the formula, by using another trick (see Figure 3). If Z=0, that part of the formula evaluates to -I. which will in turn remove the leading space.

> Kevin King Sheridan, Wyomine

The (Z=0) trick is terrific, and variations of it can be used elsewhere as elegant tests.

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USER-TO-USER

FIND Unquoter

I'm a frequent user of the DOS FIND filter and grew tired of having to enclose each string I was searching for inside quotation marks. I figured out how to fix FIND.EXE so that quotes are not necessary (see Figure

4). The drawback is that this new version of FIND can't search for strings containing spaces. I named this utility after the UNIX command FGREP.

Walter Bright Kirkland, Washington

```
echo off
mode coml:1200 >nul
mode comilizes hul

if %1 == TOM goto tom

if %1 == tom goto tom

if %1 == DICK goto dick

if %1 == dick goto dick

if %1 == HARRY goto harry

if %1 == harry goto harry
echo ATDT&1; >com1;
goto exit
itom
echo ATDT111-1111; >coml:
goto exit
idick
echo ATDT222-2222; >coml:
goto exit
ibarry
echo ATDT9-333-3333: >coml:
rexit
```

Pick up the handaet first then, after the dialing is complete, echo preas any key to disconnect the modem. echo . pause

echo ATH >coml:

Figure 1: DIAL BAT batch file to dial with a 1200-band Haves modern. Be sure MODE COM is on your disk or PATH to it. Substitute your own names and numbers for TOM, DICK, and HARRY (as well as 111-1111, 222-2222, and 9-333-3333).

DEF FNST\$(Z)=RIGHT\$(STR\$(Z),LEN(STR\$(Z))-SGN(Z))

Figure 2: Stripper enhancement that works for negative numbers.

DEF FNSTS(Z)=RIGHTS(STRS(Z),LEN(STRS(Z))-SGN(Z)+(Z=0))

Figure 3: Best stripper-this works with both negatives and zero.

```
A>copy find.exe fgrep
     1 File(s) copied
A>debug fgrep
-е 3сс
xxxx:03CC 75.4e
                    8A.98
-e 3e9
xxxx:03E9 22.20
<u>-е Зес</u>
xxxx:03EC
           AC.98
                    3C.98
                            22.98
                                     74.98
xxx:03F0 0F.90
                    4E.98
Writing 18DB bytes
A>ren farep farep.exe
```

Figure 4: Instructions for changing DOS 3.0 FIND. EXE so it doesn't require that you put quotation marks around strings for which you want to search. Type in everything underlined and hit the Enter key at the end of each line. Ignore the xxxx: parts; the hex numbers that appear here will vary from system to system.



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MARKETING



PC MAGAZINE . JUNE 25, 1985

The drawback you mentioned isn't a problem, since you can always use the original FIND filter when searching for multiple words separated by spaces. Another way to eliminate the need for quotes is to create a batch file. F.BAT. containing the line:

FIND "%1" %2

To find every occurrance of DIR in COM-MAND.COM for instance, just type:

F DIR COMMAND.COM

Big Letters

Users with color systems can produce unusually large letters in text mode in 16 colors by sending a value of 12 out to port 984. The program BIGLET, BAS (see Figure 5) OUTs the proper value and controls the location of these large characters. This mode is not supported by IBM; the screen will flicker, and there are problems both in the text offset and in character overlap.

```
100 ' BIGLET, BAS -- by Brad Thurber
110 SCREEN 0:WIDTH 80:KEY OFF:CLS
120 OUT 984,12
130 LOCATE 1,1: PRINT "Hit ESC to end"
140 FOR Y=2 TO 15
150 LOCATE Y,1
160 FOR X=1 TO 30
170 COLOR RND*13+2
180 AS= ": WHILE AS= " : AS= INKEYS: WEND
190 IF A$=CHR$(27) THEN SYSTEM
200 PRINT AS:
210 NEXT: NEXT
```

Figure 5: BIGLET.BAS program to produce unusually large letters on RGB monitors.

I've tried this on the standard IBM RGB monitor, but not on composite screens. Brad E. Thurber Fort Wayne, Indiana

While this isn't really all that useful, it does produce a flickery, attention-getting

program; hitting Esc drops you out of the program and into DOS. The 6845 chip on both the color and mono boards can do far more tricks than IBM uses.

Hex Strings Restrung

In response to the User-to-User Hex image. We added an escape route to the Strings tip (PC Magazine, Volume 4 Num-

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A>ren sample.exe sample.exx A>debug sample.exx

-rcx CX 8888

-s 100 0880 'A CHARACTER STRING' xxxx:0803

-e 9893 "A DIFFERENT STRING"

Writing 0880 bytes

A>ren sample.exx sample.exe

Figure 6: General instructions for replacing text with new character strings. This example also demonstrates that you must change the name of an .EXE file you're revising since DEBUG won't write to an .EXE file. Rather than simply rename the .EXE file, it's better to copy the old .EXE file to one with a new non-. EXE extension. If you're dealing with a non-. EXE file, you can skip the first and last steps above. Type in everything underlined and hit the Enter key at the end of every line. Ignore the xxxx:; the hex numbers that appear there will vary from system to system. And make sure the new string is the same length as the one you're replacing; pad it out with spaces if it's too short.

ber 6), Jack Motz. Richard McOuillan. C.A. Morrell, David Casassa, and one or two other readers pointed out the ineffi-

ciency of entering English text in hex bytes and offered different solutions. McQuillan's was the obvious one explained in the DOS manual; all you have to do in DEBUG is enclose the text you want to enter between single or double quotation mark delimiters. He added that the only restriction is that if you want to enter a auotation mark as a character within the delimiters, you must double up the quotation mark, Pascal-style. So, to change the power-on message to "This is PC's DOS." you'd have to type:

E 1072 'This is PC"s DOS

making sure you pad out the extra characters with trailing spaces to cover over the ones in the original message. McQuillan also noted that the extra quotation mark doesn't get entered into memory and therefore shouldn't be counted when matching a new string's length with an existing one.

Morrell's solution was similar, except he used the DEBUG F command. To replace "The IBM Personal Computer" with "Beam me outta here Scotty" in the

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USER-TO-USER

opening message, he entered

-F 1072 L19 "Beam me outta here Scotty"

(The L19 represents the hexadecimal length of the string being written—here 25 characters, or &H19.) Casassa's method was more complex.

Casassa's method was more complex. To enter "This is the life" as CS.0100, he suggested getting into the DEBUG miniassembler and typing

a 100 db 'This is the life'

making sure to hit the Enter key twice after the final quotation mark. He also furnished a caveat: "Keep in mind that here an offset supplied to the 'a' command is by default an offset to the CS register, not the DS register, as is the case with the 'e' command." but added that it was easy to overside his default the main PS 1000.

mand' but added that it was easy to override this default (by typing DS:0100). Jack Mots echoed McQuillan's textbook solution and provided a general formula for making changes (see Figure 6). His example renames an EXE file, since

DEBUG won't write to an .EXE file.
Motz also notes that either single
quotes or double quotes may be used and
that you must use the same type of quote to
end the string that was used to start it. This
allows you to include a single quote in the
string by using the double quote as the de-

The general process involves involving DEBUG and the name of the file you want to change, determining the length of the file o

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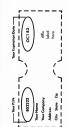


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PC Tutor

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I frequently get questions about number representation in general and about the handling of floating-point numbers by BA-SIC in particular. Since this is such a complex topic, I've decided to devote two entire columns to it. Let's begin by describing the different ways in which numbers are written.

Number Systems

One of the first things newcomers notice when they start reading computer magazines is the frequency with which they encounter hexadecimal (base 16) numbers. This often causes confusioneven anger-at what is perceived as unnecessary jargon. In fact, however, there are very sound reasons for using hexadecimal notation in preference to decimal (base 10) notation. Even binary (base 2) notation should be used in certain circumstances. Figure 1 shows both (a) the symbols used to denote different digits and (b) several examples of numeric equivalences for the ~

of this magazine already knows, all machine code consists of nothing but strings of binary (base 2) numbers.

As a concession to human weakness, however, references to "computer numbers" are conventionally translated (even

One thing clearly evident from Figure 1 is the "obvious" truth that the more different symbols you have available to represent a number, the shorter the number can be written. FFFF (hex), 65535 (decimal) 177777 (octal), and 111111111111111 (binary) are all the same number, but the first representation takes 4 places and the last takes 16 places. Humans have trouble keeping track of long strings of numbers (ensuring that 16 and not 15 successive 1s get printed in this paragraph is a proofreader's nightmare, for example), but for a machine this system is much easier than keeping track of a lot of differently valued symbols. Two is the minimum number of symbols needed to represent 1 and not-1 (i.e., 0), and, as presumably every reader

our number bases commonly used in omputer writing and programming.			by a utility like DEBUG, which works di rectly on machine code) into hexadecima	
(a) Name hexadeci decimal octal binary	.mal 16 19 8	Numeral S 0,1,2,3,4, 0,1,2,3,4, 0,1,2,3,4,	5,6,7,8,9,A,B,C,D,E,F 5,6,7,8,9	
(b)	_			
hex 1	decimal 1	octal 1	binary	
8	8	10	1000	
A	10	12	1010	
P	15	17	1111	
10	16	28	10000	
3 E8	1000	1750	1111101000	
400	1024(1K)	2888	10000000000	

65535 Figure 1: The four common number bases, with examples.

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PC TUTOR

form. Each hex digit is the equivalent of four binary digits (bits), as shown below:

hex	hinary	hev	hinar
-	8888	-8	1000
1	8881	9	1001
2	8818	Ä	1010
3	0011	à.	1011
4	0100	c	1100
5	8181	Ď	1161
6	9110	2	1110
7	#111	F	1111

Two hex digits thus represent 1 byte of information, and from the table above you can always translate down into binary to see which bits are 1s and which are 0s.

Bytes, of course, need not have been defined as containing 8 bits. Earlier in computer history, grouping things in terms of the possible values of 3 bits at a time was popular, giving rise to octal (base 8) notation. (That's the last time I'll mention octal.) But the "powers of x" idea is as strong in computer design (where x is 2) as in "human" design (where x is 10), because it is the most efficient way to handle place value. (If we'd been born with eight fingers on each hand, the same smart Arab who gave us 10 arithmetic symbols would have squiggled his pen a few more times and we'd have one-place "mathematical" symbols for the numbers from 10 to 15. And we'd all think more like our computers.) Mathematically, if a number is represented as a sequence of digits:

dn ... dydydgin e number base b

A few examples of working with hex in terms of the PC's 8088 microprocessor will show how much clearer hex makes

The 8088 has 20 address lines. Each line can be a 0 or 1 (this is digital; ones are +5 volts and zeros are 0 volts). Thus, the 8088 can address at most

things than does decimal.

1111 1111 1111 1111 1111 binery (or FFFFF hex or 1,848,575 decime1) characters (bytes). We generally say that

the 8088 has a 1-megabyte memory capacity. The exact number in base 10 (1,048,757) is meaningless, but it is very meaningful in either binary or hexadecimal. Both are much closer to the way the computer thinks. [Note: for visual clarity we have inserted spaces after every four binary digits, much as commas are conventionally used with groups of three decimal digits. If you ever type binary numbers into a program, however, you must be careful not to use such spaces, because the

computer will not ignore them.—Ed.]
Thus, if you wok in hexadecimal, just by knowing that the 8088 has 20 address lines you immediately know its directly addressable memory capacity. Similarly, if you tell me that an integer is stored at 0050hez, 1 know immediately that (1) the machine uses 16-bit addresses, and (2) when the integer is accessed, lines 9, 8, 2, o should be high; the rest should be low. This is because 0305 hez = 0000 0011.
This is because 0305 hez = 0000 0011.

gins with the right-most digit.)
Consider next the way the 8088 computes the addresses of objects. It does this by combining the contents of two registers (normally, DS and DX), each of which contains a 16-bit quantity (4 hexaderimal digits). If we refer to DS:DX, for example, the actual address in decimal would be calculated via:

This looks a bit strange to me in decimal notation, and it is not easy to calculate—try it, assuming DS is 4096 and DX is 256, for example. If we switch to hexadecimal, however, the problem becomes

which looks a lot simpler. In fact, it says: put a 0 at the end of the number in DS and add it to that in DX. Now, using the same numbers as above (in hex), we have

Thus, the effective address is 10100 hex. If you did it in decimal, you'd come out with 65792.

Conclusion: when referring to the IBM PC, it often makes much more sense to state computer references in hexadecimal

or binary.

So much for written language, now let's see why computer languages use binary internally for calculations. The internal representation of a number is the way a

computer encodes it into its internal memory (registers). There is actually no intrinsic reason that a computer or computer language could not use decimal notation internally, but there are good mathematical reasons why it usually doesn't.

Hardware and Accuracy

To understand why computer languages use binary arithmetic internally, we should start by understanding why the computer chips have small registers. Why does the 8088 on the IBM PC have 16-bit registers rather than 100-bit registers, which would produce greater accuracy?

Today's digital logic requires one line (that is, an electrical path) for each binary digit (bit) in a number. This is a consequence of recognizing only two voltage levels: low (0) and high (1). For each line on a microprocessor chip, however, there are probably 5 to 10 more supporting chips on the computer motherboard for buffering and control. Thus, the fewer outside lines a microprocessor chip (a CPU) has, the cheaper it is to design and build both the chip and its support. The 8088 is relatively cheap, since it provides only 8 data lines to the outside world, even though internally it "thinks" with 16 data lines. (In the jargon. the 8088 has an 8-bit external data bus and a 16-bit internal data bus). This means that sometimes a numeric transfer requires two successive accesses to memory: one for the low 8 bits and one for the high 8 bits.

The 8026 used by the PC AT, on the thoch rand, has a full fel-bit data a full fel-bit data full fel-bit full fel-

Thus, to reduce cost in computer designs, the hardware people use as few data bits as possible, both internally and externally. Microomputers are usually 8- or 16-bit designs, while mainframes are typically in the 60- to 80-bit range.
While the hardware designers have an

interest in reducing the number of bits in a register, the language writers, on the other

side, want to minimize the errors that result from arithmetic roundoff and overflow. One way they do this is by using binary arithmetic internally. Let's compare arithmetic strength—that is, the accuracy and range—of an 8088 language that represents numbers in binary form internally, (which we read as hexadecimal) with one that uses decimal internally.

ust des-occima internative; gip has a marmon value of 15 decimal (1111 bits). Hence it requires 4 bits in order to repensent the full complement of hexades digits. A decimal digit also requires 4 bits, however. (Try to represent 8 or 9 showever. (Try to represent 8 or 9 shows 15 bits, if you're skeptical.) An 8058 register. books 16 bits of information. Thus, the should be the significant of the significant of the significant than) 4 bec digits or 4 decimal digits (15 bits total). Now consider a number, (16 bits total). Now consider a number, a capable 1273 decimal (445 in bex). A decimal language stores x as

1 2 3 7 0001 0010 0011 0111 A binary language stores x as

4 d 5 (hex)

In this example, the only difference lies in the encoding method, but a hint is given by the fact that the binary/hex version needed only three digits to represent the decimal quantity 1237. If you now return to the last example shown in Figure 1, you'll see that since the 8088 has 16-bit registers it can easily manipulate any number up to FFFF (65535 decimal) by using hexadecimal encoding. On the other hand, if the 8088 uses decimal encoding it can only easily manipulate numbers up to 9999. This means that by thinking internally in hexadecimal (or binary), a language running on the PC can increase the usable range of its arithmetic by 6.5 times, in comparison with decimal. Indeed, the disparity gets even larger with bigger word sizes. A machine with 32-bit internal arithmetic increases its arithmetic range by 43:1 if it uses hex, not decimal, internal representation.

The PC Tutor solves practical problems and explains points of general interest. To see your questions answered here, drop a line to PC Tutor, PC Magazine. One Park Avenue, New York, NY 10016.



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A Bridge to Better Graphics: The Math Utilities

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raphics programs don't like me because I know too much mathematics. For line graphs they want pairs of numbers. I respond too generously by presenting them, in effect, with an infinite number of pairs by asking for plots of such equations as the parabola $y = x^2$

For any value of x you please, the corresponding y value is well defined: just multiply x by itself. Since graphics programs tend to be business-oriented, they can't deal with this kind of information Instead, they tediously insist on being told that y = 0 when x = 0, y = 1 when x = 1, y = 4 when x = 2, and so on.

Unless you enter a large number of pairs for such functions, the resulting graph can look pretty sad, its smooth curve broken into a series of straight-line segments. Scientists pay a high price for abandoning the simple definition by

The Math Utilities Bridge Software

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List Price: \$35 for each or \$90 for all three (add \$1.50 for handling); special prices for schools.

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equation in favor of pairs of points. To display scientific graphs, they need a package specifically designed for such

Easier said than done. Scientific graphics software usually means one thing: curve-fitting. These programs know what curves you want to draw, but they expect to have to guess the correct formula. Once you provide them with enough pairs of data points, they give you a graph and a "best fit" equation. Such programs seem taken aback when you already have the formula and merely want them to display it.

Mark Bridger, of Bridge Software, stepped into the breach when he wrote his Math Utilities, CURVES plots planar curves, SURF, surfaces in three-dimensional space, and DIFFS, planar flowlines determined by differential equations. (I will not review DIFFS here because it is much more specialized.) A professor of mathematics at Northeastern University, Bridger understands that not all graphics consist solely of pie charts. bar charts, and scientific curve-fitting. He designed The Math Utilities to display known functions for educational or illustrative purposes.

The Math Utilities understand and accept in formulas the functions ABS. SIN, COS, ARCTAN, EXP, LN, SORT, S, C, and AT, where S and C are the sine and cosine functions whose arguments are multiplied by 2m and AT is the arctangent function divided by 2π. Bridger recently added the function ROOTn(), where n is a positive integer; for example, ROOT3(x) is the cube root of r.

High-Ouality Graphics

Graphics board.

CURVES produces high-quality output on an IBM Graphics printer or an Epson with GrafTrax. The quality is so high that I recently used CURVES 87, the 8087 version of CURVES, to produce camera-ready figures for a student solutions manual I wrote for a calculus

On a PC with 256K of RAM, the graphics program resides in 128K of memory while the Bridge Software Printerpack option uses the other 128K to draw an extra-high-resolution version of the graph. The IBM or Epson printers can draw a figure whose resolution is 1,600 by 640, far exceeding the 640 by 200 resolution of the IBM Color/

The Printerpack option relies heavily on the 8087 math coprocessor. If your PC does not have the coprocessor, the Printerpack feature will still work, but drawing the graph can take hours.

All three Bridge programs are menudriven, and the user interface is function-



Figure 1: An example of SURF's output.

al and straightforward. The Overlay option in the CURVES menu leads to a submenu that controls the Printerpack feature and the superposition of several curves on the same graph.

CURVES

CURVES is extremely flexible, permitting equations to be entered in rectangular, polar, or vector (parametric) form. In addition, two curves can be plotted simultaneously even without the Overlay option, which permits many more. Scales are completely under the user's control, as are coordinate ranges. Although the first plot is always presented on an axis system whose origin is conordinated to the control of the control of the control of the first plot is always presented or an axis system whose origin is considered to the control of the first plot in the control of the first plot for enlargement of the first plot for enlargement of the first plot for enlargement.

You may choose to have CURVES display the coordinates of the upper left-hand corner of the selection rectangle as you move it about the graph. This is an extremely convenient way to read offico-ordinates on the displayed curve. The thermore, if two curves are displayed, their points of intersection can be determined easily. If necessary, successive selections and enlargements of part of the figure will zero in on the point of interest.

Bridger recommends against pushing this process too far, however, because you may propagate errors that can invalidate your result. If you have an 8087, 15 levels of enlargement are feasible; without the 8087, no more than 10 enlargements should be attempted. Bridger notes that it is actually possible to lock up your PC by zooming in too far. If that happens you must reboot the computer.

CURVES permits you to save displays to disk as the file PICTURE. DAT. Other names are not permitted, one of the few massifactory features of the Bridge software. Saving multiple figures requires exiting to DOS and changing the filename PICTURE. DAT to avoid overwriting it with the next figure. Furthermore, only the file PICTURE. DAT may be retrieved for display, so filenames on the property of the property. The property is the property of the property of the property of the property. The property is the property of the p

SURF

SURF is even more fun to use than CURVES. Once again, the 8087 chip is needed to use the Printerpack option effectively. Figure 1 shows an example of

SURF's output with the Printerpack. SURF bristles with an incredible number of options. It produces graphs by sitting on the x-axis of a three-dimensional coordinate system and sketching what it sees on an interposed plane-rather like marking on a glass panel you hold in front of you. How close you hold the glass determines how big a figure you trace. SURF permits you to decide its viewpoint (which doesn't have to be on the x-axis) and the location of the "viewplane" (corresponding to your glass pane). You can also rotate and stretch the graph and add cross-hatching.

Despite its wealth of features, SURF manages to be easy to use. It happily chooses scales for you under the Autograph option. I found it best to use Auto-graph first and then fiddle with the results. Sometimes you need to nudge the figure with a slight rotation to get the hidden-line algorithm to work properly. Bridger details some of the problems and their solutions.

Documentation

The documentation for the Math Utilities was generated on a dot matrix printer with effective use of italic, bold, and wide fonts. The text is straightforward and a bit unusual in its approach. After detailing the features contained in the

menus. Bridger goes on to present a workshop season for each of his programs. These essions are extremely valuable and serve as tutorials. The three manuals (one each for CURVES, SURF, and DIFFS) do not contain indexes, but since the longest is only 15 pages, the absence is not keenly fell. The illustrations are helpful and were clearly produced by the software itself.

More Uniformity Needed

The Math Utilities are available separately or as as Losquie their shallarities, the programs have curious differences that are occasionally annoyal. In CURVES you hit the Ese key twice to invoke the ment. In SURF the Enter key is used for the same purpose. In CURVES or quest "out;" while in SURF the the same option means "quit and draw," that is, quit the menu, but not the program. More uniformity in the user interface would be not as the same option means "quit and draw," the program. More uniformity in the user interface would be not as the same of the same of the program.

Am I satisfied with the Math Utilities? Of course not, there are always more options to want: axis drawing, nonrectangular domains, closed surfaces in SURF, a picture editor for labeling Printerpack images, and faster print times.

Price/Performance Ratio

Am I delighted with The Math Utiliited? Absolutely. They have been a delight to use, and the results have been immensely satisfying. The price/perfordous where the satisfies of the satisfies dous. Nothing comparable is available this side of the \$350 program from EnerGraphics (see "Graphics that Dress for Success," PC, Volume 4 Number 1). The software is not copy protected, another thing 1 appropriate and, in fact, indight processing the satisfies of the satisfies of the satisfies of the satisfies of the satisfies have been satisfied to the satisfies of the satisfies have been satisfied to the satisfies of the satisfi

Now that my student calculus manual is finished, my publisher wants one for instructors. Bridge software will again be my primary graphics tool. I just can't imagine being without it.

Anthony Barcellos is a government analyst in Sacramento, California, a freelance mathematics editor/writer, and a software librarian of Sacramento PC.

Confessions of a PTA Fund–Raiser

Here's one PC owner's advice on how you can use your PC to rake in money at your children's fund-raising extravaganzas. Interactive BASIC programs that challenge and intrigue can make you the star of the show.



one are the days of baking cookies and trying to pawn off raffle tickets on friends and relatives.

Now, my PC makes brownie points at my children's fund-raising events.

Long after all the face-painting, handicraft, and baked goods booths play out, my computer-ade stand continues to attract long lines of pint-sized, computerhungry kids. And while my trusty PC rakes in the dough, it also conducts some computer literacy work. Skeptical parents slowly begin to smile when they discover their children are not spending money to chase a goofy "pill" around a maze but are experimenting with a customized BASIC program. Your PC can help make the parent-school connection more efficient in various ways. Word processing, database, and mail merge programs all make the myriad of rosters. lists, newsletters, and fund-raising events—which make up the normal parental curriculum—a breeze. But, even though all of this behind-the-scenes computer power will certainly be appreciated by your local PTA, computer activities that have dramatic flair raise lots of money and are obviously more fun to do.

Letters to Santa

At nursery school Christmas fairs, my PC woos the uninitiated with a short but sweet interactive program that lets kids type personalized letters to Santa.

As each child operates the keyboard, the computer asks, "What's your name?" Delighted with the machine's interest, the child carefully hunts and pecks an answer. "How old are you?" asks the computer. Again the child responds. "Have you been good this

year?" asks the computer. Ah, the questions are getting tougher. "What would you like for Christmas?" was the computer's ultimate query.

After a child answers the series of juestions, the program prints a pensonalized letter to Santa using big block letters. Rows of time (Volterman teres) and from X's and O's dot the border of the letter. And, in keeping with the spirit of the occasion, the PC offers a rousing eradition of Jingle Bells while the printer churns out the letter. I then mount the printers charms out the letter. I then mount the printers out the printers of the printers of which is the printers of the printer

A Mother's Day Sequel

A Mother's Day version of the computerized letter fund-raiser also wins rave reviews. Mommy-adoring children (reveisbly type the answers to computergenerated questions such as "Mats' to the hair color!" "What's her favorite place to visit?" and "What's your favoie number?" The child presses the Return key to start the customized Mother's Day card rolling. A large heart and arrow surround the entire assemblage and its decorative borders tell who the card was

One 5-year-old girl input the following Mother's Day ode:

On Mother's Day your BROWN hair Smells like TULIPS on a sunny day! I love you 30 times Don't ever go too far away.

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I'll make you a card and love you still

Interesting Dynamics

These two simple programs generate unbelievable enthusiasm. In fact, some interesting dynamics transpired when I set up my computer-ade stand at a few school fund-raisers. Older children read to and prodded younger ones along. Shy children put forth a shaky little pointer finger and asked me to help them find the keys. Other more explorative children pushed my helping hand away and embarked on their own painstaking search for the proper keys. Kids began to predict the print spooler magic and summon the recipient of the upcoming printout long before the child's name emerged on the

Groups of kids began singing along with the computer, and kids of all ages returned to the line a second time, begging to create yet another computerized masterpiece. Older kids questioned the elements of programming. "What would happen if we typed a silly answer?" they asked. "I bet I know how you made those Christmas trees, like this," exclaimed one youngster, as he excitedly began to draw characters on a scrap of

My two simple programs generated unbelievable enthusiasm when I set up my computer-ade stand at school fund-raisers.

paper. The other fund-raising booths had their share of attention, but my computer-ade stand attracted a dedicated and steady following.

Anticipating the "What Ifs"

777

When designing these games, I tried to anticipate the spectrum of possible responses. The questions I invented were simple and nonsexist, and all of them could be answered in short phrases. In addition, the program was designed to challenge children of all ages. The graphics and music captivated the children, and the interactive session was long enough to be meaningful, but short enough to keep the crowds moving. The printout was an attractive take-home re-

The interactive session was long enough to be meaningful, but short enough to keep the crowds moving.

minder of the child's effort. At the events, I always hide all wires, keep the CapsLocks key on throughout the day, and try to direct an orderly flow of iuvenile traffic. I enforce proper rules of computer etiquette, including no drinking, eating, or painted-up hands at the keyboard, and I do not allow children to pull from the printer without my blessing. I learned to put a decorative covering over the disk drives in order to eliminate the temptation of seeing what lies behind the computer's trap doors.

Success Stories

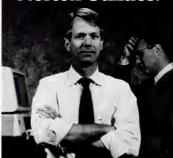
Both of my computerized fund-raising ventures have been financial and psychological successes and required only an infinitesimal knowledge of BASIC to design. The PC always emerges as Mr. Personality-adorable, entertaining, lovable, and cute. Because of the nature of the events and the simplicity of the programs, very few would believe that my PC compiles C programs at home.

Conclusion

With apologies to Henny Youngman. I ask you, take my program, please. Both the Dear Santa and the Mother's Day programs are available on PC's Interactive Reader Service at (212) 696-0360. You can impart your own customized permutations and combinations, change the music, change the graphics, and change my poor attempt at poetry. These programs are simple and easily modified. Happy fundraising!

Robin Raskin is a frequent contributor to several computer publications, including PC Magazine.

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GTE's on-line medical database, MINET, offers a good solution to this problem with its MGH-CME service. I believe this section is more useful than any other part of the database (see "Find It with MINET," PC, Volume 4 Number 2, for a general description of MINET's other services.

Interactive Courses -

MGH-CME consists of a collection of interactive, self-paced medical courses that are developed and maintained by the Massachusetts General Hospital, the major teaching hospital for Harvard Medical School.

The system covers 24 subjects, including anticoagulants, arrhythmias, basic life support, digitalis, arterial blood gases, cardiopulmonary resuscitation, neonate hepatitis prophylaxis, and hypertension.

You can access courses either through a menu or with a three-letter subject code. Each course consists of a case simulation that's based on one specific area of medicine. When you've finished one example, you can choose to go on to an-



other in the same field, switch specialty areas, or quit the system.

But MGH-CME does not give you the same case simulation each time you select a given course. The system continually generates new scenarios for each subject area and keeps tabe on how many times you have gone through a given subject. It also augments the difficulty of the case each time you reaccess the same subject area.

In addition, Massachusetts General Hospital continuously updates the course information to keep up with changing medical thought and practice.

Various Approaches

MGH-CME uses four approaches multiple choice, free text (essay), tutorial, and vocabulary—to teach the material. Although you choose the subject, the system chooses the method of presentation.

The multiple choice question (MCQ) course presents a brief description of a clinical situation and asks you to choose which of several steps is appropriate. If you pick the wrong answer, the system explains why it's wrong angives you another chance to select the correct response.

The free-text courses ask you for essy-type responses, and then the program searches your input for certain keywords to determine the correctness of your answer. For example, the course that helps you practice how much of the drug counsadin to administer to a patient to maintain a therapeutic PT (a blood text) simulates the time lag between when you administer the commadin and when the drug takes effect. It then shows patient to which you must respond. Thus, it forces you to deal with metabolic and drug-drug interactions.

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MEDICINE

A Lecture Format

The tutorial courses present information in a lecture format that is interspersed with multiple-choice and freetext questions. The course determines your level of comprehension by your answers. Every tutorial course has many sections and a table of contents, so that you can choose a given section or group of sections without going through all the subjects covered by the course. Or you can follow the program's suggestions, which are based on your answers to test questions, as to what sections of the tutorial are appropriate to your level of expertise. If you leave the system and then log back on, the system saves your place so you can begin where you left off.

The vocabulary-item type of courses initially present a brief case history. At the prompt, you can ask questions, perform a physical exam, order laboratory studies, or administer therapy.

The problem with the vocabulary section is that you must look through a user manual to find a number that corresponds to the phrase you want to enter. Each course has its own different set of phrases and numbers, so it almost takes a juggling act to keep going. This, however,

was the only weak point I found.

That aside, the system works beautifully. Like disk-based simulations, such as those offered by CME Incorporated, the patient's progress is dependent on the accuracy of your therapy (see "New Approaches to Practicing Medicine," PC, Volume 4 Number 11, for a review of CME simulation software). The program returns lab values with a simulated time delay and periodically prompts you for a diagnosis.

Special Options

You may request two special sets of options at any point within the vocabu-

lary courses. The "rules" option explains medical or clinical rules as they arise during the course. While you are working up a patient, the system monitors your actions. If you neglect something important in the scenario, the system will intercede to remind you of it. For example, if you're dealing with a febrile, unconscious patient, you might receive the following prompt:

YOUR ATTENDING PHYSICIAN SUGGESTS THAT YOU PERFORM A

LUMBAR PUNCTURE [RULE 91. The rules option allows you to ask why the rule was invoked, the purpose and definition of the rule, or what action the system suggests you take. In the preceeding example, if you enter PURPOSE, the program responds:

A LUMBAR PUNCTURE IS A KEY TTEM IN THE WORK UP OF A PATIENT WHO IS SUSPECTED OF HAVING MENINGITIS.

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The second set of options, called the "consultant" options, is even more useful. I only wish I could use the consultant options, which are divided into six parts, independently of the CME program to help in my daily clinical work.

The "item info" option provides information about the numbered items in the course book. This information constitutes what the system's developers call a mini textbook about the item.

The "best tests" option lists the available tests that are likely to be of value given the information you've already obtained from the system.

The "consider" option allows you to select a possible diagnosis and then lists the tests most likely to confirm or refute

that diagnosis. The "discriminate" option allows you to choose two possible diagnoses and will then list the best test to distinguish between them.

The "leading diagnosis" option allows you to display the most likely diagnosis based on the information you've already collected.

The "teaching" option discusses the general approach to diagnosis in the specialty field that you are currently using.

I went through the anemia, abdominal pain, arterial blood gas, and cardiopulmonary resuscitation sections four times each. I didn't experience the same case or even two similar cases twice. Each section was realistic, well planned, and informative. I truly learned from each case I went through and had fun doing it.

AMA Credits

To top it all off, you can receive several Category I CME credits, sponsored by the Harvard Medical School Department of Continuing Education, for completing each of these scenarios. However, these are American Medical Association cred-

its. It's \$60 per year for AMA members and \$100 per year for non-AMA members. You just register when you log on

to the service. The only real complaint that I might raise about these programs is the cost, Even though GTE has reduced the monthly rates to a \$20 minimum, the hourly fees are substantial. Using the MGH-CME service costs plus the base Telenet charge and local phone costs, and you've got quite a bill. Then there's an extra charge if you would like CME credit from Harvard. In fact, all CME courses are expensive, especially when you have to leave your practice to attend them. However, in this case, the high quality of the product allows me to overlook its high price.

Bernard Friedman, M.D., is a pulmonogist and an intensive-care specialist in Ithaca, New York.







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Forecasting Tools for The Business Manager

Now you can do your own business forecasting on a PC. New interactive programs save time, improve accuracy, reveal hidden trends, and introduce some effective new techniques.

Intil recently, business forecasting software was custom-programmed for mainframes and run by a technical staff. The job of computer-aided forecasting was unwieldy and too slow for managers facing typical I-need-it-yesterday pressures. But times have changed. New interactive programs transfer forecasting techniques to the PC, making the process quick and accessible to business people themselves.

to dusiness people inemserves.

These for recasting programs model historical data in one of two ways. The first is linear regression, which computes the average relationship between a dependent variable, such as sales, and one or more independent variables, such as advertising, GNP, price, and so forth. The second approach is extrapolation, or time series for recasting.

A time series is a set of data collected at of the monthly sales for a product. Time series forecasting is easier than regression because independent variables are not used. Forecasting is done by first identifying patterns such as seasonal cycles or trends in the history of the data and then projecting them into the future.

Time series forecasting typically stars with a statistical test to determine whether a seasonal cycle exists and computes if it does. Next the program offers you several choices for the rate of growth (trend) in the forecasts. Common options are no trend at all, a straight-line trend, or an exponential trend—one in which the growth rate increases continuously. Finally, the program asks how many forecasts you want to make.



Forecasts for these options are usually presented as graphs showing how the forecast compares to historical data. A program should also give you confidence intervals—statistical boundaries that may be exceeded only a specified percentage of the time. For example, the forecast for next month may be 100 units, with a 59 percent confidence interval of 20 units. This means roughly there is a 95 percent chance that sales will range from 80 to 100.

Factors Affecting Accuracy

Whether your forecasts are made by regression or time series models, accuracy depends on several factors. One is randomness, or "noise," in the data, which, since it cannot be predicted, limits accuracy. If 10 percent of each data point is due to randomness, an average

error of 10 percent is the best you can expect. Another factor is the forecast horizon, or how far in the future you are trying to forecast. Errors become larger as the horizon increases.

"Scrubbing" (adjusting the data to remove the effects of one-time events like sales promotions or unusual weather) also has a tremendous impact; so do changes in the number of trading days from month to month. It's necessary to compensate for these factors to avoid distortion.

Judgment Calls

Although software manuals rarely admit it, there are many situations in which human judgment is the only realistic approach to forecasting. One occurs when not much data is available for modeling—forecasting sales for a new product, for example. Or the marketing environment may change drastically. making historical data irrelevant.

When you have adequate data, modelbased forecasts are preferable to human judgment. Why? Modeling saves time, especially if you have a lot of forecasts to make It may also reveal features in the data that could be overlooked. For examnle, using a model adjusted for seasonality can reveal trends concealed by seasonal patterns. Modeling also gives you a benchmark for evaluating judgmental forecasts.

In choosing a forecasting program, look for three key features. First, you need good graphics to help you decide which model to use and to present the forecasts. Second, your data probably comes from existing spreadsheets or databases, so make sure that the forecasting program can use these files. Third, look for a program that automatically adjusts data for seasonality. Without auto-

matic seasonal adjustment-you are in for a lot of time-consuming work before you can begin forecasting.

If you need background, Forecasting Methods for Management by Wheelwright and Makridakis (John Wiley & Sons, New York; 4th edition, 1985; ISBN 0471-816-876) makes good reading because it assumes no prior knowledge of statistics. It also has many examples that can be repeated on the PC.

1.2.3 FORECAST!

There are several programs aimed at the beginning forecaster. If you use Lotus's 1-2-3, your best bet is a little gem called 1.2.3 FORECAST! Consisting of seven templates, it offers seasonal adjustment, regression with one or two independent variables, and time series forecasting. By staying in 1-2-3, you can avoid having to export your data files and learn the command structure of another

program. Another big advantage is that you can customize the templates.

1.2.3 FORECAST! comes with a good set of tutorial exercises in forecasting airline revenue passenger-miles. Just about everything in 1.2.3 FORECAST! is menu-driven. Most of the menus are three or four levels deep but include the ability to back up to the previous level if you make a mistake. The templates contain a number of slick error-trapping routines that beep and present an error message on the control panel. These messages are tailored to whatever template you are using. When an error message occurs, all you have to do is press the Enter key, which backs up the program and lets you try again.

One problem with 1,2,3 FORECAST! is that data files can have only 60 observations. According to the author, Bruce Gates, this restriction was imposed to

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CompuCast CompuCast Software

5328 Fulton St. San Francisco, CA 94121 (415) 386-6153 List Price: \$49.95; enhanced version is

Requires: Lotus's 1-2-3, Release 1A.

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Graph n' Calc Tekkon Corp.

100 Jericho Quadrangle Jericho, NY 11753 (516) 822-8300 List Price: \$195

Requires: 64K, one drive, DOS 1.1 or later, color/graphics card, Lotus's 1-2-3. Release 1A, or Tekkon's Synthesis pro-

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save storage space on floppies-the templates take up 165K. Gates is mulling over the idea of adapting the templates for hard disks. He is also planning to fix a problem in the manual data-entry mode. which requires you to specify the number of observations before you start entering data. If your count is wrong, you might lose the data and have to start over (I did this twice). Moreover, a general disadvantage of forecasting with 1-2-3 is exe-

cution speed. For example, you should expect to wait 30 to 40 seconds for re-

gressions to run. CompuCast

CompuCast, another beginner's template for Lotus's 1-2-3, has much greater deficiencies. For some reason, the author of this program did not use the macros for the menus built into 1-2-3: The CompuCast menus are just lists of macros in the body of the spreadsheet. I was particularly irritated by the manual, which is so full of jokes and cute sayings that it was hard to figure out what the program does, which really isn't much.

CompuCast computes seasonal adjustment factors by simply averaging the same months-it averages all January figures, then all February figures, and so on. Although I don't have the space to explain it here, there are far more accurate ways to calculate seasonal adjustment. Then the program asks you to put in an "eyeball" estimate of a straightline trend, which is extrapolated into the future and adjusted for seasonality. If this is all you want to do, write your own template and save yourself \$90.

Graph n' Calc

For people other than 1-2-3 users, a good beginner's choice is Graph n' Calc. a program that has been around for a while. Graph n' Calc is bundled with a decent introductory book on forecasting and includes a set of easy-to-use models for seasonal adjustment, regression, and time series forecasting. It also offers standard graphics (bar, stacked-bar, pie, line). DIF format file handling, a desk calculator, the ability to calculate net present value and internal rate of return, and a few general statistics functions. The program also has a weird sort of spreadsheet that does row arithmetic only. One warning, however: Granh 'n Calc has to be booted with the original systems disk.

As you'll soon discover, good pro-

grams can help improve your business forecasting.

N.B. Forrest is a general business consultant based in Carlisle, Pennsylvania.

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ty. For the optional composite video interface, the polarity is negative and the level is 1 volt peak-to-peak. (List Price: Without options, \$220; with parallel port, \$245) Emulex Corp.

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SLIM 2000
A hard disk with cartridge tape subsystem, offering 10 megabytes of formatted storage on the hard disk and on each tape cartridge. The unit connects to the user's system via a single interface card for both components of

The enclosure, designed to closely complement the IBM PC, also contains power control and surge suppressing circuitry. Power for up to three external devices can be controlled from the SLIM 2000's front panel switches.

the unit

SLIM 2000 STOIN panel switches.
(List Price: \$2,995)
Datatron, Inc.
Listancement Products Div.
2942 Dow Ave.
Tustin, CA 92680
(714) 544-9970
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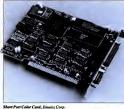
Digital Oscilloscope Peripheral,

Rapid Systems
Digital Oscilloscope
Peripheral

A standalone unit that allows the user's system to act as a digital oscilloscope. Specifications for the four-channel device include a 2 millihertz sampling rate, a 500 kilohertz analog bandwidth, and diode protection at all inputs.

Included software allows menu-driven operation of the device, with variable time base values and polling of channels.

(List Price: \$499)
Rapid Systems
\$415 136th P1. S.E.
Bellewe, WA 98006
(200) 641-2141
CRICLE 648 ON
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SHOTT OT COME CHILD, EMBLEY COT,

New on the Market Submissions Guide

Owing to the high volume of new product materials received each week at PC. all submissions to New on the Market should follow these guidelines: 1. Include the retail price and details of both hardware and software needed for an end-user to properly use your new product. This includes required amount of RAM, unmber and type of drives, operating systems supported, and peripheral equipment needed.

amount on KAMs, numeer and type or ortives, operating systems upported, and perspect acquipment necess.

A: Releases should be type-written flowbib-spaced on one cisis of the paper. Copies of advertisements may be included, but in most instances we need more information than is typically included in an ad. Include telephone context for marketing and technical questions.

3. If available, included black & white glossy photos of the periodic, 4.5 in clinics or larger.

New on the Market does not review products; do not send sample or demo copies of software. All product announcements are run on a space-available basis, at the exclusive discretion of the editor. Please note that it is impossible to guarantee publication of a product announcement for any particular issue.



KEYPORT 300 Touchpad, Polytel Computer Products Corp.

KEYPORT 300 Touchpad with KEYWARE Development System A programmable touchoad

offering 300 function key areas. These areas can be individually programmed for particular applications and labeled by using graphics

The KEYWARE Development System software permits advanced users to program the touch areas on the KEYPORT 300 board to perform a variety of functions for other users. Features include macros to pause for user-input, on-line definition of KEYPORT/PC keystroke sequences, and the ability to create custom help windows that can be linked for use as a tutorial or running demo. (List Price: KEYPORT 300) touchpad, \$195; KEYWARE Development System, \$249) Polytel Computer Products Corp. 1250 Oakmead Pkwy., #310 Sunnyvale, CA 94086 CIRCLE 646 ON READER SERVICE CARD

DM4962X Modem A 9,600 bits per second modern meeting the proposed CCITT V32 protocol standard. It is capable of 9,600/4,800 bps data transfers over standard two-wire phone lines in either asynchronous or synchronous operations, with automatic speed and bit rate selection

to match the remote end of a connection. Other features include local or remote soft-strap configuration, a built-in adaptive equalizer and echocanceler, auto-dial and autoanswer functions, and diagnostic capabilities. The DM4962X modern also includes an interface for use with a four-port synchronous multiplexer. (List Price: Available from the manufacturer) British Telecom Business Systems

23 Howland St. London, WIP 6HQ GB (011-44-1) 631-2122 (011-44-1) 631 2078 CIRCLE 658 ON READER SERVICE CARD

Sakata SP-1500 Printer A dot matrix printer capable of print speeds up to 180 characters per second. Equipped with both friction and tractor feed mechanisms, it can accent continuous fanfold, cut sheet, or roll

paper. It can also reversefeed the paper, allowing multiple passes on printouts. Other features of the printer include a 3K RAM buffer, a user-definable 256character set, and built-in in-

ternational, italic, pica, elite, condensed, doublewidth, and super/subscript fonts. It is equipped with a Centronics parallel interface, and has a serial interface available as an option. (List Price: \$585) Sakata USA Corp. 651 Bonnie Ln. Elk Grove Village, 1L 60007 (312) 593-3211 CIRCLE 651 ON

READER SERVICE CARD ExpressData 12i

A plug-in, 1200 bps modem that the user can upgrade at any time to 2400 bps. It also features adaptive equalization, which permits the

modem to adjust automatically to varying phone line conditions.

The ExpressData 21i modem features Haves protocol compatibility and asynchronous full- or halfduplex operations, as well as auto-dial and auto-answer functions.

Relay, a communications program that comes with the modern, supports PC-to-PC and PC-to-mainframe communication, provides password and encryption security, and directly emulates IBM 3270 terminals. It also performs data compression. effectively raising data transfer rates. Alternatively, the modem will work with most other communications software, including Crosstalk, Smartcom, PC-Talk, and others.

meets Bell 103 and 212A standards, operates at 1200. 110/330 bps, and is compatible with most modems at the remote end of a connection. Voice/data switching under software control allows the user to alternate between voice and data communica-

The ExpressData 12i



ExpressData 12i, Telenctics Corp.

tion within the same call. (List Price: \$495) Telenetics Corp. 895 E. Yorba Linda Blvd. Placentia, CA 92670 (714) 524-5770 CIRCLE 656 ON

READER SERVICE CARD

SpiderNet

A low-cost local area network permitting up to six serial devices to be linked interactively. These devices can consist of as many as five PCs and one peripheral. All functions are selectable from any port, and the LAN automatically detects and uses the proper transfer rates for communications between devices, from 110 to 9,600 bits per second. This permits devices with differing bps rates to be interconnected at any two ports.

Other features include a

built-in date and time clock. support for XON/XOFF and CTS/DTR protocols, and complete software control of RS-232 lines. Available options include a Security version, which intercepts incoming calls and requests password clearance before permitting connections to be completed, and a system multiplexer, allowing data from up to five lines to be combined to the sixth (List Price: Standard or Security version, \$495; Multiplexer, \$495) Artisoft Inc. 2450 E. Speedway #4 Tucson, AZ 85719 (800) 821-6010 (602) 327-4305 CIRCLE 645 ON



PCVISION Frame Grabber, Image Technology Inc.

PCVISION Frame

Grabber A plug-in board permitting the user to capture, store, process, and display images taken by a standard analog video camera. The board features 8-bit digitization and the ability to generate false color images from monochrome input.

PCVISION can display images on a monitor with a resolution of 512 × 480 pixels. Each pixel can be displayed in one of 256 possible levels of grey or in one of 256 colors from a palette of 16 million. (List Price: \$2,995) Requires: ImageAction software, RS-170 analog video camera. Image Technology Inc. 600 W. Cummines Pk. Woburn, MA 01801 (617) 938-8444 Telex: 94-8263 CIRCLE 636 ON READER SERVICE CARD

dClock

A real-time clock/calendar circuit board that is userinstallable directly onto a PC

motherboard rather than into an expansion slot. The device automatically enters the correct date and time whenever the system is booted. (List Price: \$59.95) Microsync, Inc. Computer Products Dept. P.O. Box 116302 Carrollton, TX 75011 CIRCLE 650 ON

READER SERVICE CARD

OCTOCOM A plug-in adapter permitting the user to add up to eight serial ports to a PC system. OC-

TOCOM modules, which attach to the adapter board via a single ribbon cable, allow applications software to access the additional ports by using COM3-COM8 in place of the standard COM1-COM2 designations

OCTOCOM's features include Progammable Array Logic (PAL) address decoder and interrupter circuitry, used to configure a system for specific applications. OCTODRIVE software, available as a separate product, provides a software-installable PC-

DOS and BASIC device driver.

OCTOCOM modules are available with four, six, or eight channels. (List Price: 4-channel module. \$295: 6 channels. \$345: 8 channels, \$395; interfacing cable, \$75; OCTODRIVE software, \$25) Star Gate Technologies P.O. Box 764 Cleveland, OH 44026 (216) 292-5390 CIRCLE 647 ON READER SERVICE CARD

MS-200 Image Scanner A deskton image scanner that can accept documents up to 81/2 by 24 inches. It digitizes the image at 200 pixels per inch resolution. Using data compression techniques, the MS-200 can compress text at a 10:1 ratio, with a comparable compression ratio for graphics. This substantially reduces the

disk space and system memory required to store images. The MS-200 Image Scanner offers switch-selectable scanning modes for text. picture, or mixed images. In mixed mode, up to four picture windows are permitted.

Documents are scanned and moved one line at a time while the optics assembly remains stationary. This method minimizes misalignment common in scanners with moving optics assemblies. (List Price: \$1,700) Microtek Lab. Inc. 177221 S. Western Ave. Gardena, CA 90247 (213) 538-5369 CIRCLE 654 ON

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LLOY/MICROSYSTEMS MD52 52799 52 Meg hard disk

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IBM SYSTEMS

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supply 52764 ENHANCED PC - IBM PC, 256K. I floppy drive. 10 Meg

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SOFTWARE

EASEL, Version 1.1
An applications development tool used to create independent, PC-based user
interfaces for remote mainframe applications. Systems
developed under
EASEL let PC users inter-

actively access, manipulate, and manage mainframe data and applications, using displayed symbols instead of syntax-sensitive commands.

Syntax-sensitive commands. For software developers, EASEL permits the rapid development of user interfaces without requiring modification to the mainframe applications software. If desired, EASEL can use such hardware as high-resolution color graphics, touch-sensitive screens, and digital mice to enhance the developed interface.

Since EASEL is application- and device-independent, it can be used for almost any application.

Advanced prototyping capabilities permit the developer to design interface screens without actually linking to the target mainframe application during development.

EASEL's other features include support for the Dia-blo color ink jet printer; built-in textual regions for inserting, moving, editing, and deleting blocks of text on the screen; and automatic redrawing of edited graphics to speed the creation of com-

plex presentations.

The basic EASEL package contains two authoring licenses, ten end-user application licenses, two training



EASEL, Interactive Images, Inc.

course credits, documentation and training manuals, custom development support and training, and six months free maintenance. (List Price: \$24,000; additional run-time licenses, \$890)

Requires: 512K RAM, two 360K drives, PC-DOS 2.x, color/graphics adapter. Interactive Images, Inc. 600 W. Cummings Pk., a4500

Woburn, MA 01801 (617) 938-8440 CIRCLE 627 ON READER SERVICE CARD

Menu System Manager A utility for organizing applications programs and DOS routines. Menu System Manager allows any DOS command or program file (.EXE., COM., BAT) to be menu-driven. After execution of a program, control returns to the menu, permitting other programs to be activated with minimal keystrokes.

The utility can assign password security control to any menu entry and maintains an automatic log each time the system is accessed. The log files contain such data as date, time, user I.D., commands executed, and purpose of the access, useful in compiling system-use reparts from the part of the control of the part of the control of the part of the control of the part of the p

cations program invoked.

Menu System Manager allows the user to create an unlimited tree structure of
menus with a maximum of
40 entries per menu. User-

two header lines, a date and time display, and a selection of foreground, background, and border colors if used on a color system. The program also for alternative automatic screen blanking and cursorcontrolled selections. (List Price: \$129.85) Requires: 128K RAM, one disk drive, PC-DOS 2.x. Gurdak Software Development 158-B Mereline Ave. W. Patterson, NI 07424

designed screens can include

158-B Mereline Ave. W. Patterson, NJ 07424 (201) 785-2498 CIRCLE 661 ON READER SERVICE CARD

Development System
An automatic screen format
generator for Borland International's Turbo Pascal.
GTP permits the programmer to create program displays interactively, for
which the software generates source code.

GTP Program

and retrieval functions, automatic field editing, arithmetic and table lookup functions, and full keyboard utilization. The software is written in Turbo Pascal, allowing the user to extend its functions as desired.

GTP features include

built-in database update

(List Price: \$99.95)
Requires: 96K RAM, one
disk drive, PC-DOS 2.0,
Turbo Pascal 2.0.
Allen, Emerson &
Franklin, Inc.

P.O. Box 928
Katy, TX 77449
(713) 391-8570
CIRCLE 659 ON
READER SERVICE CARD



The Recipe Writer, At-Your-Service Software, Inc.

The Recipe Writer A recipe management program capable of storing thousands of recipes and retrieving those that meet userdefined criteria. Recipes that use procedures already defined in other recipes can be linked, eliminating repetitious data entry. In addition, the program can print lists of ingredients and compose shopping lists of ingredients from all the linked

recipes. Other features of the program include the ability to convert serving amounts instantly and to note bibliographical data such as the magazine or cookbook in which the recipe appeared. (List Price: \$150) Requires: 128K RAM, one disk drive, PC-DOS. At-Your-Service Software, Inc. 309 W. 97th St. New York NY 10025 (212)866-2186 CIRCLE 635 ON

READER SERVICE CARD

onTime

A scheduling system capable of performing control as well as planning functions. Written in dBASE II. onTime releases jobs by priority, following either a schedule it develops from user-established dispatching rules or a user-created schedule. The scheduling system

does not use either the critical path method or material requirements planning approaches to establishing schedules. Instead, the user is prompted to define key resources (personnel, equipment, etc.) and task assignments. Next, the user enters the dispatching rules to be followed (first come first served, least processing time, least slack-time, worst

lateness, and so forth), by

which the software deter-

mines the queuing order for processing jobs. onTime can aid in tracking job costs by establishing actual hours worked, percentage of work completed, and work remaining for completion. It computes job costs and calls attention to schedule variances, pinpointing the areas where the

job flow varies from original

projections. Because the program is written in dBASE II and has source code provided, the user may easily customize reports, add features, and interface the system to other applications. onTime is also compatible with dBASE III. (List Price: \$495) Requires: 128K RAM, two disk drives, PC-DOS. dBASE II or dBASE III. Wyman Associates 525 California Dr. Burlingame, CA 94010 (415) 343-3900 CIRCLÉ 660 ON READER SERVICE CARD

DATAWRITE Corporate General Ledger

A general ledger system compatible with either PC-DOS or XENIX operating systems. A major component of the software, the DATAWRITE Matrix Report Writer, allows the user to specify any accounts in any order while preparing reports, as well as to change account descriptions without affecting the basic chart of accounts.

The reporting facility also allows page columns, headings, subtotals, and totals to be printed or displayed in any format desired. This permits the user to create a li-

brary of stored management and financial reports for an unlimited number of journals and charts of accounts. (List Price: \$2,995) Regulres: 256K RAM, two disk drives, PC-DOS or XENIX. Accountants Microsystems Inc

3633 136th Pl., S.E. Bellevue, WA 98006 (206) 643-2050 CIRCLE 641 ON READER SERVICE CARD

FASTWARE TMS 3.0 An enhancement utility for PC-DOS that reduces disk access times by as much as a hundredfold, FASTWARE



DATAWRITE Corporate General Ledger, Accountants Microsystems Inc

TMS 3.0 accomplishes its rapid data accessing by setting up a portion of RAM in the user's system as its own disk caching and print buffering reserve.

The utility, which also cuts hard disk-to-floppy backup times by 50 percent, can operate with as little as 16K RAM. It is transparent to PC-DOS and is installed without modification to either the user's hardware or applications software. (List Price: \$60) Requires: 128K RAM. one disk drive, PC-DOS. THESYS Memory Products 7345 E. Acoma Dr. Scottsdale, AZ 85260 (602) 991-7356 CIRCLE 634 ON READER SERVICE CARD

PrinScil

A printer configurator utility allowing the user to access a printer's features without programming escape or other control codes. Features include menu-driven selection of printer options and the ability to save configurations to disk for later reuse.

PrinScil supports printers using the IBM, Epson, Okidata, and Mannesmann Tally printer control codes. (List Price: Single Printer Version, \$29.95; Multiple Printer Version, \$49.95) Requires: 128K RAM, one disk drive, PC-DOS 2.x. compatible printer. SofScil

13812 S.E. 240th Kent, WA 98042 (206) 631-4212 " E 633 ON **1SERVICE CARD** F*I*F

A program-development aid for BASIC, simplifying the programming of data input screens. Designed to be used by the novice BASIC programmer, it provides an automatic means of obtaining compact BASIC subroutines that can be accessed by simple GOSUB commands.

F*I*F. which stands for Fill-In-Formats, allows up to nine different screen formats for each program under development. Each format can have up to 50 data entry fields, and the length of a field can range from one character position to an entire line. Formats can be color or monochrome. with a width of 40 or 80 columns

All subroutine code created under F*I*F can be compiled; also, a subroutine's operation may be previewed before it is merged with the main program.

(List Price: \$49.95)

Requires: 128K RAM. one disk drive, PC-DOS 2.x. Siskiyou Software 830 Garden Way Ashland, OR 97520 (503) 482-1908

CIRCLE 632 ON READER SERVICE CARD

LYNC 4.1

A communications program for the IBM PCir, allowing it to communicate with on-line data and telex services, mainframe systems, and other microcomputers. The program permits automated logon and send/receive routines, unlimited-length batch files, unattended operation, and password protection.

In addition to these features, LYNC 4.1 can also set parity and bit length rates automatically, sensing the requisite parameters from the system being called. Error-checking protocols include Xmodem and a proprietary protocol. The program will also

work with any other modemequipped IBM PC system at rates up to 9,600 bits per second (List Price: \$195) Requires: 64K RAM, one disk drive, PC-DOS 2.1.

Norton-Lambert Corp. P.O. Box 4085 Santa Barbara, CA 93103 (805) 687-8896 CIRCLE 630 ON

READER SERVICE CARD

SRMS (Software Revision Management System) A set of related utilities to help software developers keep track of changes to the source code of computer programs. SRMS allows specific versions of a program to be retrieved and records pertinent data on changes as they are made.

All versions of the program under development are stored in a single SRMS library, without duplication of common code or text. This allows different versions of a program to be stored together on disk while using only slightly more space than required for a single version. SRMS also permits

changes to be made without conflict to older versions of a program while newer versions are being developed. (List Price: \$69.95) Requires: 128K RAM, two disk drives, PC-DOS 2.x. Ouilt Computing 7048 Stratford Rd. Woodbury, MN 55125

(612) 738-6793 CIRCLE 664 ON READER SERVICE CARD



Golden Years

A tool for investigating the financial aspects of retirement planning. With GoldenYears, the user specifies current and anticipated retirement financial profiles, entering such data as current income, expenditures, invested capital, anticipated inflation rates, and years re-

maining before retirement.
Goldent'ears then performs a series of equations to
determine whether the desired post-retirement standard of living can be
achieved. If it cannot, the
program indicates adjustments that can be made in the
current standard of living
to achieve the desired
goods.

goals. GoldenYears also estimates the maximum post-retirement standard that can be achieved with any given current profile, and the maximum retirement period that can be achieved without altering either current or desired profiles. (List Price: \$125)

Requires: 128K RAM, one disk drive, PC-DOS. JCW Enterprises, Inc. 25150 Thorndyke Southfield, M148034 (313) 353-7492 CIRCLE 828 ON

READER SERVICE CARD

ACCESSORIES

Qualtec Security Products
Three security products designed to protect a user's
hardware and software. The
products, PC-LOK, FILE-LOK, and DATA-LOK secure confidential data files,
PC hoards, hard disks, computers, and peripherals.
The PC-LOK device covers the power switch and the back panel, preventing access to the user's system and internal circuitry. The lock is constructed from ½-inch

aluminum.

FILE-LOK protects a
full-height 5½-inch floppy
disk drive even while the
drive is in operation. It will
also stop a floppy drive from
copying hard disk data files
by denying access to the
diskette within the drive.

The DATA-LOK software requires that a ten-character user-selected password be entered in order to access confidential data files. (List Price: PC-LOK, \$149.50: FILE-LOK, \$19.7.95: DATA-LOK, \$99.95) Qualtee Data Products, Inc. 1400 Coleman Ave., aD23

Santa Clara, CA 95050 (408) 496-6184 CIRCLE 640 ON READER SERVICE CARD

(408) 496-6184 CIRCLE 640 ON READER SERVICE COOL IT A replacement of

COOL IT
A replacement cooling fan
kit with a replacement filter
element. The low-noise
COOL IT fan is mounted to
the outside of a component's
enclosure, requiring no tools
or technical ability for installation. The fan is available in black, beige, grey,
and white.
(List Price: COOL IT Fan,
\$33.95: replaceable Filter 5

\$39.95; replaceable Fills Paks, \$4.99) Proto PC Inc. 2439 Franklin Ave. St. Paul, MN 55114 (612) 644-4660 CIRCLE 643 ON READER SERVICE CARD



Stelex Computer Furniture, Stelex Corp.

Stelex Computer Furniture A line of steel office furni

A line of steel office furniture designed specifically to hold PC equipment, providing both convenient placement of components and protection against theft. The Stelex line includes variously sized desktops, legs, keyboard drawers, CPU pedestals, and adjustable monitor

support arms.
Computer equipment remains locked within the furniture at all times, even during use. A drill- and pick-resistant lock located on a rear access door, coupled with a steel bar that holds the computer in its compartment in front, effectively secures the equipment against theft.
(List Price: Prices vary ac-

(LIST Price: Prices vary according to configuration) Stelex Corp. 2265 Westwood Blvd., #644 Los Angeles, CA 90064 (213) 202-7097 CIRCLE 685 ON READER SERVICE CARD A keyboard hand and wrist rest providing comfort when the operator is not typing in data. The unit is equipped

the operator is not typing in data. The unit is equipped with a nonskid bottom surface to prevent movement from a fixed position. Designed to complement

the IBM PC keyboard, the Wrist Rest can be with used with similar keyboards from other manufacturers as well.
(List Price: \$20.95)
Milfoam Corp.
P.O. Box 4023
New Hayen CT 06525

(203) 387-8433 CIRCLE 638 ON READER SERVICE CARD

Veloci-Tek Paper

A plotter paper designed to produce crisp, reproducible charts and drawings even with felt-tipped pens. Veloci-Tek paper features a smooth, slightly glossy surface and comes in two sizes



(8 × 11 inches, 11 × 17 inches) and two weightsregular for standard plotter use, and heavy for illustrations and charts that will receive much handling. There are 50 sheets to a package. (List Price: \$6.78-\$15.87 per package, depending upon size and weight) Taylor & Associates 8601 Urbandale Ave. Des Moines, IA 50322 (515) 276-0992 CIRCLE 657 ON READER SERVICE CARD

Compact Work Desk A one-piece computer desk with vertical storage space. The desk (Model CT137) has a 52- × 49-inch work surface and a drawer on the user's right. The front edge of the computer desk is tapered for comfortable use of a keyboard

Adjustable floor levelers keep the unit level and eliminate vibration. Other features include a full-length bookshelf with a retainer rail at the top of the unit, a smaller storage shelf, and a monitor shelf. The latter two shelves are adjustable. (List Price: \$219.95) Bush Industries, Inc.

312 Fair Oak St. Little Valley, NY 14755 (800) 228-2874 CIRCLE 652 ON BEADER SERVICE CARD

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for circuit designers" (Personal Software Magazine 11/83). Regarding MICROLOGIC . . . "An efficient design system that does what it is

supposed to do at a reasonable price" (Byte 4/84). MICROCAP and MICROLOGIC are

available for the Apple II (64k), IBM PC (128k), and HP-150 computers and priced

at \$475 and \$450 respectively. Demo versions are available for \$75 MICROCAP II is available for the

Macintosh, IBM PC (256k), and HP-150 systems and is priced at \$895. Demo versions are available for \$100. Demo prices are credited to the

purchase price of the actual system.

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Dishing Up Computer Tidbits

Two books offer the voracious reader ample food for thought: One presents a smorgasbord of computer lore; the other examines the ingredients that make up today's computing environment.

t began with cute jokes comparing | food processors to word processors and poor puns on jargonese like menus, bytes, and nibbles. Now the analogy between food and computers has become something of an industry standard. Two books, Digital Deli, edited by Steve Ditlea, and The Computer Cookbook by William Bates help perpetuate the metaphor of computers as "food for thought." Both books give readers plenty of computer memorabilia for their money. The first is an impressionistic collection of essays, the second a more mundane encyclopedia of facts. Both will fill hungry minds with juicy tidbits about the computer industry.

A Movable Feast

Digital Deli is laden with history, trivia, opinion, and well-written chronicles
about the plight of Everyman in the computer age. The menu (or table of contents) at the Digital Deli offers short, upbeat essays documenting the lore and
lure of the computing world. These deli

Digital Deli

The Lunch Group Edited by Steve Ditlea Workman Publishing Co., Inc. 1 West 39th St.

New York, NY 10018 (212) 398-9160 Copyright: 1984 Cover Price: \$12.95 ISBN: 0-89480-591-6

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delights are culled from a group of popculture-loving, computer-supporting journalists and industry specialists who call themselves the Lunch Bunch. The Lunch Bunch contributors include

The Lunch Bunch contributors include Stephen Levy, author of Hackers, Nolan



Bushtall, founder of Alari, Dan Briellin, sroducer of Viriader, Peter McWilliams, the world's "cutest" computer author; computer wishon; computer wishon; Computer wishon; Colus. Each subtor gets three or four pages of large-format, well-produced type. Esther Dyson (Computer Industry Daily) explains why the Macintohis the Column of the C

computer adventure games, and Ken Uston explores the computer's potential as a gambling machine.

More than just a vertical selection of computer hackers, Digital Deli features input from Henny Youngman (Take My Computer, Please), William Buckley (The Conservative Computer), Timothy Leary (Personal Computer), Personal Freedom), and Ray Bradbury, among others. The book's recipe for success is to let the flavor of each author come

through.
Organized on the menu theme, Digital
Organized on the menu theme, Digital
Doli features over 100 computer chefs,
offering almost 400 pages of selections.
"Appetizers" sets the historical stage of
computing, and "Personal Choices" is a
shout their favorite machines. "World
shout their favorite machines. "World
should" offers an assortment of pour
computer languages; "Creative Combos" looks at computers and their bedfellows in the arts, and "Tomorrows" specials "discusses the futuristic dessert. "Fresh Greens" focuses on big
money Issues, while "Family Favormoney Issues, while "Family Favor-

inc." Jooks at the computer widow, whis kids, computer dating, and other sociological marvels. Philosophers will enjoy the "Brain Food" selections on expert systems and AI Globalists will want to read the excellent accounts on the state of computing abroad. All the selections are didosyncratic, and I found them marvelously entertaining.

The Digital Deli will not satisfy every-

one's taste, however. The writing tends to-

ward "hip" and is based on the highly personal experiences of each writer. True to the pop journalism ethic, the book can be faulted for slanting issues, for Gonzo journalism, and for an over-reliance on highflown epistemological terminology. The essays create moods and impressions as much as they impart fact.

In Digital Deli, the computer is a paradigm for life itself: In understanding it, we understand ourselves: in exploring it. we explore ourselves; in extending its capabilities, and applications, we extend our own. Take the Lunch Bunch out for lunch-vou won't be sorry.

The Computer Cookbook

The Computer Cookbook is a wellwritten, information-laden book in search of an audience. Now in its fifth edition, the book is decidedly more tonical and less oriented toward giving "helpful hints" than in earlier editions. More than 125 topics are tackled in its 400 large-format pages, but just who would use such a book remains a mystery to me.

Organized alphabetically as an encyclopedia of computer-related information, The Computer Cookbook provides a comprehensive introduction to computer basics and current computer technologies. The collection is more than a computer dictionary but less than a techical reference. The articles tackle technical material, industry news, product information, and controversial opinion in a clear, concise manner. An extensive listing of software and hardware manufacturers and distributors is given. The list-

contribution to the field. A Bountiful Banquet

ings include a synopsis of each entrant's The Computer Cookbook offers few recipes for successful computing, but it does provide a careful look at the fundamental ingredients of the computing environment. As the reader sojourns alphabetically, from accounting and Ada through writing style and Xerox, he will notice that each topic is treated in the cool, calm manner of technically competent journalism.

Some of the topics impart helpful information about the way things work-for example, the sections on modems and light pens. Some of the sections-like education, software publishing, and artificial intelligencebarely scratch the surface, but others, like agriculture and law, give readers a feeling for a specific computing milieu. The book treats computer languages in a careful, unbiased way and emphasizes the generic features of fundamental software applications like spreadsheets, word processing, and databases.

All reference books, especially those

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on computers, have intrinsic problems. The Computer Cookbook suffers from the weaknesses of the genre. First, many important topics are neglected or referenced in an obscure fashion. Some of the critical omissions include topics like computers in medicine, science, and architecture. Moreover, a computer reference book has a terribly short shelf life: It's usually dated by the time it hits the streets. In this respect, The Computer Cookbook starts out at a disadvantage: It contains nothing on Tandy's newest PC clones, and there's no mention of AT&T at all. For every product that is discussed, at least ten important ones go un-

mentioned altogether.

Another problem is that some of the information in the book—like the instruction sets for popular microprocessor chips, printer escape sequences, and commands for software packages—are descriptions intended for a very different set of readers than those who want to know what a portable computer or plotter can be used for. The book secrifices unit by trying to be all things to all people.

Using The Computer Cookbook as a basic reference is akin to using the encyclopedia to learn history. You'il learn enough to hold your own at cocktail parties, but not much more. It's the sort of book that grandmothers might buy for their computer-generation offspring at Christmas.

Something for Everyone

Nonetheless, The Computer Cookbook is illuminating and manages to have something for everyone. The easy-toread style, graphically attractive layout, and carefully chosen subjects will help you understand the working nature of the

- HAGE FILE

The Computer Cookbook William Bates Quantum Press/Doubleday 245 Park Ave. New York, NY 10167 (212) 953-4561 Copyright: 1984 Cover Price: \$14.95 ISBN: 0-385-19291-6

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computer universe. Novices can use it as a stepping stone to aid their travels, and old timers will find e refresher course in the state of the art. Reference books are often something to be levy of, but while PC Magazine.

this book has some of the weaknesses of the genre, it is well done.

Robin Raskin is a frequent contributor to



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SNA Strategies

Linking a PC to a mainframe isn't as diflicult as it seems—if the existing SNA infrastructure is utilized. PC Tech Journal introduces IBM's System Netwood Architecture (SNA) and offers four strategies for bridging the micro/mainframe gap as well as thoughts on combining micro/mainframe communications with local area networks.

PGC and VX/PC

An in-depth review of two sophisticated products for graphics professionals: IBM's Professional Graphics Controller and the VX/PC from Vectrix.

COBOL

In continuing coverage of the migration of COBOL to the PC, PC Tech Journal will review compilers from Microsoft, Micro Focus, and Digital Research.

Tools for C Programmers

Window libraries allow C programmers to partition single applications with windows and update these windows independently. The second part of a three-part series, "Tools for C Programmers" compares six window libraries.

PC/IX

IBM's single-user entry in the UNIX market, PC/IX, is put through its paces in PC Tech Journal's investigation of implementations for the IBM XT.

Pocket APL

PC Tech Journal looks at Pocket APL, a new package from STSC, the makers of APL-Plus, which provides an inexpensive introduction to the APL language.

Dot Matrix Typesetting With LePrint

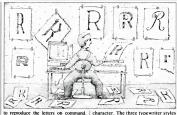
LePrint turns your dot matrix printer into a typesetting shop-without complicated typesetting codes. It can produce 13 different typefaces in sizes ranging from 1/2 inch to over 10 inches

n expensive daisywheel printer is not the only way to obtain true letter-quality print from a computer system. Nor do you have to shell out money to your local printer to get typeset material. A new program, called LePrint, turns your dot matrix printer into a typesetting shop. With any one of 38 supported printers, it can produce 13 different typefaces, ranging in size from just 1/12 inch to over 10 inches. What's more, you can use these different typefaces and heights within the same line of

And LePrint doesn't require any complicated typesetting codes. It works with WordStar and ASCII files by using several special dot commands. (LeBaugh plans to release versions of LePrint that are adapted to other word processors soon.) For example, to print the text "Now we have 1/4 inch Helvetica" in Figure I, you insert the command ".fa helvetic" to specify Helvetica typeface and then type ".ch .25 in" to select letters 0.25-inch high, LePrint also accepts character heights in centimeters, millimeters, picas (about 1/12 inch), points (about 1/72 inch), and several other systems of type measure.

Digitized Typefaces

To produce this typesetting magic with inexpensive dot matrix printers, the developers of LePrint have taken a number of common type styles and digitized them. By enlarging each letter on a screen, they were able to assign digital values to the form of each letter and translate these values to computer code



to reproduce the letters on command. This process is possible because the computer can control each dot that forms the

LePrint offers five standard typefaces and eight optional typefaces (see Figure 1). The program has easy-to-understand menus and lets you select choices in one of two ways, either by moving the cursor and pressing the Enter key or alternatively by entering a highlighted letter. If you make an error, the screen tells you nicely about the problem.

Typewriter Type Styles The standard set of typefaces consists of three monospaced typewriter styles and two proportional typefaces. Most electric typewriters and dot matrix printers produce monospace type, which allots the same amount of space to each available in the basic LePrint program are Courier 10, Pica 10, and Prestige

Proportionally spaced print varies the

LePrint LeBaugh Software Corp.

2720 Greene Ave. Omaha, NE 68147 (800) 532-2844 (402) 733-7600

List Price: \$149, including five type styles; additional styles, \$19 each Requires: 128K RAM (DOS 1.1) or 192K RAM (DOS 2.0 or higher); single or double-sided floppy drives or hard disk; color/graphics adapter recommended.

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space allotted to a letter depending on the letter's width, producing a more even and pleasing look to the page. LePrint's standard set supplies two proportional typefaces. Times Roman and Times Italic. Times Roman, one of the most popular styles for typeset material, is the typeface used in PC Magazine. You can print out any of the 13 available type styles in sizes ranging from what I call "Myopic Nightmare" (1/12 inch) to something larger than the Big E on an eye doctor's vision chart.

Previewing Type

Using a color/graphics adapter, you can preview output on the screen as it will appear on the typed page; a monochrome adapter lets you see the output only in normal screen text size and not as it will ultimately appear. So the color/ graphics card can be helpful if, for example, you've accidentally told the program to print letters 5 inches high when you ac-

Over 50 help screens guide you through installation. but the process is so simple that you may never

see most of them. tually meant .5 inches high. You will see that huge letter start to form on the screen and can immediately halt the display to correct the error.

LePrint comes on three disks. One contains the LePrint program, an on-line help program, two files to install LePrint, and a test file to check your installation. The second and third disks have the type library files on them-all the information the computer needs to produce a wide variety of available letters, numbers, and symbols. The distribution disks are not copy protected. You can easily install the files on a hard disk subdirectory.

A Goofproof Installation

Over 50 help screens guide you through installation, but the process is so simple that you may never see most of them. The main program also has plenty of help screens.

To install LePrint, you respond to

This is default fice size -- and the This is recolar Latter Sothic. This is

Courses 10.
This is 15 point Times Roman and Times Now we have 1/4 inch Helvetica

The a Post of some and Clarendon, with a Big

lake un olbe Englishe Signe

or include a line or two of Greek andyale/nddukunforporrderseu ANI AEZHOK AMNROIP LTOO XOG

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¥ ∆ ▼ □ □ □ □ ● ○ ○ o o * i i * ® Figure 1: A sampler of LePrint's typefaces.

menu choices on the screen. You have to tell LePrint whether you have a monochrome or color/graphics adapter and select from one of the 38 currently supported printer models. If your printer isn't listed, you may still be able to install it indirectly as a compatible printer. The company plans to continue to adapt the program to additional printers on the market. At the end of the installation process, the program produces a data file, named LP.INS, with detailed information about your computer and printer system. So, you will never have to run the installation again unless you wish to change some parameters.

Impressive Resumes

Writers can easily find a number of uses for LePrint, such as designing impressive resumes or ad copy. A small business that uses typesetting services to produce brochures or flyers can save a good bit of money by creating the originals with LePrint and then using offset printing or even photocopying if quantities are small. With LePrint, newsletters look as if they've been professionally printed

For example, I recently wanted to develop a new brochure to better describe my business. I wrote the basic copy using WordStar and then used LePrint to experiment with different print sizes and

type styles until I was happy with the result. Page design by experimentation is easy-you simply change the typeface and/or character height commands in the text file

Printing your text file is very simple. You save your file, exit to DOS, and type LP followed by the name of your text file (including PATH commands if needed), and then the printer starts buzzing away. If you're not happy with the results, you go back to your text file and change the two dot commands.

Three Printing Modes

You can print in one of three modes. Letter-quality mode produces the best print quality. Correspondence mode uses lower-resolution graphics to output copy at a faster rate. Draft mode gives you a draft at high speed using the normal character size of your printer; in this case, the printout will show page breaks but you can't use the special typefaces.

Printing a document with LePrint is

Writers can easily find a number of uses for LePrint, such as designing impressive resumes or

ad copy.

naturally slower than running off a copy with your word processor. My C. Itoh Prowriter printer normally runs at 120 cps but makes at least four passes to print one line with LePrint. However, other system configurations-with different print buffers and varying amounts of RAM-may give you faster or slower printing. You will probably go through ribbons faster than usual doing this kind of graphics work, but the output has to be seen to be believed. And the price seems very reasonable given the versatility of the program, LePrint will enhance your simple dot matrix printer output not only to letter quality, but far beyond.

Charles Anderson, a professional librarian and information broker, is president of Answers Unlimited, a Chicago-based firm that specializes in indexing books and creating on-line databases.

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Coming Up



Optical Character Readers

Say you have a stack of typed pages that you'd like to have on disk so you can manipulate them with your word processor. You could spend hours keving them in, or you could avoid the bottleneck at the keyboard by running it all through an optical character reader (OCR). They range from sophisticated machines that can handle proportional spacing and gulp down full pages at a time, pictures and all, to simple hand-held line readers. All quickly and painlessly transform hardcopy into ASCII files. PC Magazine looks at six of the most noteworthy machines, from the \$499 Oberon OMNI-READER to the \$36,500 Kurzweil 4000. We also tell you about a software package designed to make your life easier by putting an OCR to work reading resumes.

Database Retrospective

It's been a year since PC surveyed the database management field in Project Database. What's new in today's database marketplace? In this special report by Alfred Poor, we'll fill you in on new and interesting products and intriguing updates of older products (about a dozen programs in all). We'll also explore the latest trends, keeping you in touch and up-to-date in a rapidly changing market.

Backup Software

Backing up your hard disk data onto floppies can be so tedious and time-consuming that it is a primary candidate for procrastination-paving the way for tragedy. A few companies claim to have introduced software that potentially averts hard-disk disaster y making the chore of backing up virtually effortless. Do they work? Are they easy ough for you to want to use them regularly? Winn L. Rosch has some answers.

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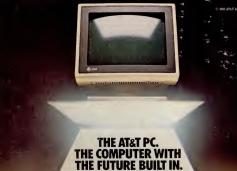
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